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# **University Students' Use of Technologies in China**

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Submitted for the degree of Doctor of Philosophy  
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June 2012

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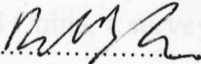
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# Abstract

Much has been written in the last few years about 'Net Generation' students in western industrial advanced countries (e.g. Kennedy *et al.* 2007; Salaway *et al.* 2008; Jones *et al.* 2010). However little is known about these students and their use of technologies at universities in China.

As one of the first empirical studies of the Net Generation university students' use of technologies in mainland China, a survey was administered to students across eight disciplines in one university during May-July 2010. The aim was to understand how university students in mainland China use technologies in their daily lives and to support their learning. In total, 2920 students completed the survey and 29 students participated in the follow up interviews.

The results indicate that students are not naturally competent with technologies and there is a diverse range in students' experiences with technologies even within the age group. There are statistically significant differences in students' access and skill levels with ICT across gender, disciplines and year of study.

Students are frequent users of instant messaging (IM), blogs and social networking sites (SNS). Nevertheless, the use of more recent web 2.0 technologies that are often associated with this generation is relatively low. There are also an increasing number of students who access the Internet via their mobile devices. Computers and the Internet have not been fully integrated into the university system, and most students use computers and the Internet for social and leisure purposes more than for learning. More in-depth investigation into students' technology practice is essential in developing appropriate guidance towards a digital culture at university in China.



**Table of Contents**

**Chapter 1 Introduction.....1**

1.1 Background of the study ..... 1

1.2 Research questions.....5

1.3 Research design .....5

1.4 Pilot study .....6

1.5 Main study ..... 7

1.6 Main findings.....10

1.7 Overview of students’ use of technologies ..... 11

1.8 Interactions with age, gender and discipline..... 14

1.9 Implications ..... 16

1.10 Contributions and limitations..... 17

**Chapter 2 Literature Review on the Net Generation .....18**

2.1 Introduction..... 18

2.2 Generational theory..... 18

2.3 Competing terms.....21

2.3.1 Millennials .....22

2.3.2 Net Generation.....23

2.3.3 Digital Natives and Digital Immigrants.....24

2.3.4 Generation Y .....25

2.3.5 Digital wisdom.....26

2.3.6 Digital melting pot.....27

2.3.7 Skepticism about the Net Generation discourse .....28

2.4 Empirical studies on Net Generation students across countries .....30

2.4.1 United States .....31

2.4.2 Australia.....39

2.4.3 United Kingdom .....43

2.4.4 Canada .....49

2.4.5 Other European countries .....52

2.4.6 South Africa.....57

2.4.7 Chile.....59

2.4.8 Hong Kong.....60

2.4.9 General empirically based review.....61

2.4.10 Theoretical approaches .....61

2.4.11 Summary.....	61
<b>Chapter 3 Literature Review on Students' Use of Technologies in China .....</b>	<b>68</b>
3.1 Introduction.....	68
3.2 Generations in China .....	68
3.3 The Post-80s in China.....	69
3.4 The Post-80s and the Internet .....	73
3.5 Access to technology and digital divide .....	78
3.6 Empirical studies on students' use of technology in China .....	81
3.7 Educational policy in China.....	84
<b>Chapter 4 Research Design and Methodology .....</b>	<b>91</b>
4.1 Introduction.....	91
4.2 Research questions.....	91
4.3 Research approach .....	92
4.3.1 Research philosophy .....	92
4.3.2 Mixed method approach .....	94
4.3.3 Research design .....	96
4.4 Setting and sampling.....	98
4.4.1 Setting of the university.....	98
4.4.2 Selection of participants.....	100
4.5 Data collection methods.....	101
4.5.1 Data collection .....	102
4.5.2 Survey .....	103
4.5.3 Interviews.....	105
4.6 Pilot Study.....	108
4.6.1 Preliminary results from the pilot .....	109
4.6.2 Implications of the pilot.....	121
4.7 Data Analysis .....	124
4.7.1 Quantitative data analysis .....	125
4.7.2 Qualitative data analysis .....	130
4.8 Validity, reliability and ethical issues.....	133
4.8.1 Validity and reliability.....	133
4.8.2 Ethical issues.....	135
4.9 Summary .....	137
<b>Chapter 5 Quantitative Results .....</b>	<b>138</b>
5.1 Introduction.....	138

5.2 Description of sample .....	140
5.3 Students' ownership and use of ICT .....	143
5.3.1 Technology ownership.....	144
5.3.2 Students use of ICT.....	146
5.4 Students' skill levels with ICTs.....	160
5.5 Attitudes toward the use of ICTs for learning .....	170
5.6 Factor analysis .....	174
5.6.1 First-Order factor analysis .....	175
5.5.2 Second-order factor analysis.....	194
5.5.3 Third-order factor analysis.....	198
5.5.4 Summary.....	199
5.7 Multivariate Analysis of Variance .....	202
5.7.1 Age.....	203
5.7.2 Discipline.....	205
5.7.3 Year of study.....	207
5.7.4 Gender.....	209
5.7.5 Discipline by year of study .....	211
5.7.6 Discipline by gender .....	214
5.7.7 Year of study by gender.....	218
5.7.8 Discipline by year of study by gender .....	218
5.8 Summary.....	218
<b>Chapter 6 Qualitative Results.....</b>	<b>222</b>
6.1 Introduction.....	222
6.2 How do students' use today's technologies? .....	225
6.2.1 Basic work applications.....	225
6.2.2 Email.....	226
6.2.3 Information searching.....	228
6.2.4 Electronic news.....	230
6.2.5 Audio and video applications .....	231
6.2.6 Instant messaging.....	233
6.2.7 Social networking sites .....	236
6.2.8 Blogging.....	239
6.2.9 More recent web 2.0 applications .....	241
6.2.10 Internet on handheld devices .....	242
6.3 What tools are students using to support their social and leisure activities? .....	244
6.3.1 Mobile phones.....	244

6.3.2 Computers and the Internet for social and entertainment purposes.....	246
6.3.3 Instant messaging.....	247
6.3.4 Gaming.....	248
6.4 What tools are students using to support learning? .....	250
6.4.1 Computers and the Internet.....	250
6.4.2 Emails .....	251
6.4.3 Multimedia courseware.....	253
6.4.4 Learning English.....	254
6.4.5 Acquiring new skills .....	255
6.5 What do students think of these technologies? .....	258
6.5.1 Attitudes towards mobile phones.....	258
6.5.2 Attitudes towards computers and the Internet .....	260
6.5.3 Computers as a subject of study instead of daily tools .....	261
6.6 Why they are using specific e-tools? What makes them use some of the tools more often than others?.....	263
6.6.1 Finance concerns: choosing between calls and texts .....	263
6.6.2 Monthly change of SIM cards .....	265
6.6.2 Choose of communication tools for different purposes.....	266
6.6.3 Social networking sites versus blogs versus QQ space .....	267
6.7 How do students 'experiences with technologies change with years? .....	269
6.7.1 Job hunting in senior years .....	271
6.7.2 Change of attitudes towards computers and the Internet.....	271
6.7.3 Attitudes towards instant messaging.....	272
6.8 Themes and discussion .....	273
6.8.1 Mobile phones.....	273
6.8.2 Integration of computers and the Internet into university courses and programmes .....	275
6.8.3 Participatory culture.....	278
6.9 Summary .....	280
<b>Chapter 7 Discussion and Conclusion.....</b>	<b>283</b>
7.1 Introduction.....	283
7.2 Findings .....	2843
7.2.1 Access to computers and the Internet .....	284
7.2.2 Internet on handheld device.....	285
7.2.3 Role of technology in students' lives.....	286
7.2.4 Using ICT for social and entertainment purposes .....	287

7.2.5 Integration of computers and the Internet into study .....	289
7.2.6 Not a homogeneous group .....	292
7.2.7 Exposure to technology doesn't lead to natural competence of a whole generation.....	294
7.2.8 Information searching strategy .....	296
7.2.9 Less competency with advanced technologies .....	297
7.2.10 Participatory culture.....	299
7.3 Chinese learners .....	301
7.3.1 The impact of respect for authority on student-teacher relationship .....	301
7.3.2 The impact of the value of scholarly honour on attitudes towards computers and the Internet .....	303
7.4 Limitations and suggestions for future research .....	304
7.4 Contribution to knowledge and understanding of students' use of ICTs in China..	307
7.4.1 Implications for teachers.....	309
7.4.2 Implications for researchers.....	310
7.4.3 Implications for policy makers .....	315
7.4.4 Implications for universities .....	316
<b>References.....</b>	<b>319</b>
<b>Appendices.....</b>	<b>365</b>
Appendix A Sample Information letter to student participants .....	365
Appendix B Questionnaire- English version .....	368
Appendix C Questionnaire- Chinese version.....	383
Appendix D Quantitative Data Output for Chapter 5 .....	392
Appendix E Interview protocol .....	425
Appendix F Sample interview transcript .....	425

**List of Tables**

Table 2.1 Terms and sources .....22

Table 4.1 Interview participants ..... 108

Table 4.2 Unrestricted Access to Technology ..... 111

Table 4.3 Unrestricted access to Internet..... 111

Table 4.4 Students’ Attitudes towards computer and other technology ..... 112

Table 4.5 Audio, video and images ..... 113

Table 4.6 Messaging and chat..... 113

Table 4.7 Social networking sites, Wikis, Blogs, and Web 2.0..... 115

Table 4.8 Mobile Phones ..... 116

Table 4.9 Games ..... 116

Table 4.10 Computer Software..... 117

Table 4.11 University ..... 119

Table 5.1 Research questions and data ..... 139

Table 5.2 Distribution of sample by discipline and year (n=2920) ..... 140

Table 5.3 Students’ technology ownership..... 146

Table 5.4 Students’ Internet access..... 146

Table 5.5 Use of audio, video and images..... 148

Table 5.6 Use of messaging and chat ..... 150

Table 5.7 Use of social networking sites ..... 151

Table 5.8 Use of wikis, blogs and web 2.0 ..... 153

Table 5.9 Use of mobile phones ..... 155

Table 5.10 Use of games..... 156

Table 5.11 Use of basic work application..... 157

Table 5.12 Use of university technologies..... 159

Table 5.13 Skill levels with audio, video and images ..... 162

Table 5.14 Skill levels with messaging and chat ..... 163

Table 5.15 Skill levels with social networking sites..... 164

Table 5.16 Skill levels with wikis, Blogs, and Web 2.0 ..... 165

Table 5.17 Skill levels with mobile phones..... 166

Table 5.18 Skill levels with games ..... 167

Table 5.19 Skill levels with computer software ..... 168

Table 5.20 Skill levels with using technology at university ..... 169

Table 5.21 Attitudes towards using ICTs at university ..... 171

Table 5.22 Usefulness of technological activities at university..... 172

Table 5.23 ICT provision at university ..... 173

Table 5.24 Cronbach's coefficient alpha for first order factors ..... 193

Table 5.25 Tests of between-subjects for second order scales ..... 212

Table 5.26 Tests of between-subjects for first order scales ..... 214

Table 6.1 List of Participants..... 224

**List of Figures**

Figure 3.1 Screenshot of Tencent QQ ..... 75

Figure 3.2 Screenshot of Baidu..... 75

Figure 3.3 Screenshot of Xiaonei ..... 76

Figure 3.4 The educational system in China..... 85

Figure 4.1 Map of China, showing Shandong Province ..... 99

Figure 4.2 Perceived usefulness of technology to assist university study ..... 121

Figure 4.3 Steps for data analysis ..... 125

Figure 5.1 Average hours spend on computers by gender..... 141

Figure 5.2 Average hours spend on computers across disciplines ..... 142

Figure 5.3 Attitude towards technology ..... 143

Figure 5.4 Use of audio, video and images..... 149

Figure 5.5 Use of messaging and chat ..... 150

Figure 5.6 Use of social networking sites..... 152

Figure 5.7 Use of wikis,blogs and web 2.0..... 154

Figure 5.8 Use of mobile phones ..... 156

Figure 5.9 Use of games ..... 157

Figure 5.10 Use of basic work application ..... 158

Figure 5.11 Use of university technologies ..... 160

Figure 5.12: Scree plot for section B data ..... 177

Figure 5.13: Scree plot for section C data ..... 182

Figure 5.14: Scree plot for section D1 data ..... 187

Figure 5.15: Scree plot for section D5 data ..... 189

Figure 5.16: Scree plot for section D6 data ..... 191

Figure 5.17: Second Order Factor Analysis..... 195

Figure 5.18: Relationship of scale orders ..... 200

**List of Glossary**

<b>BCIT</b>	British Columbia Institute of Technology
<b>ECAR</b>	EDUCAUSE Center for Academic Transformation
<b>ICT</b>	Information and Communication Technology
<b>IM</b>	Instant Messaging
<b>MANOVA</b>	Multivariate Analysis of Variance
<b>PDA</b>	Personal Digital Assistant
<b>SNS</b>	Social Networking Sites
<b>VoIP</b>	Voice over Internet Protocol



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## **Declaration of prior publications**

Prior publications by the author drawing on materials related to the thesis.

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Jones, C., and Shao, B. (2011). The net generation and digital natives: implications for higher education. Higher Education Academy, York. Available online from:  
<http://www.heacademy.ac.uk/resources/detail/evidencenet/net-generation-and-digital-natives> (last accessed 18th June, 2012).

# Chapter 1 Introduction

## 1.1 Background of the study

Nowadays, technology is involved in nearly every aspect of people's lives and challenges the traditional concepts of economy, politics, business and also education. There has been great movement in the past few decades toward using technology to enhance learning experiences (Andrews and Haythornthwaite, 2007; Garrison and Anderson, 2003), and technology is inevitably transforming teaching and learning in new and powerful ways. Technologies do have great potential benefit for education, but rigorous research is needed if we want to gain a genuine understanding of how technology can be used effectively.

Recent years have seen a growing interest of research into students' experience of learning with technologies (Conole *et al.* 2006; Creanor *et al.* 2006; Sharpe and Benfield, 2005). For example, the European Mediappro project (Mediappro, 2006), the EDUCAUSE Center for Academic Transformation (ECAR) survey of Undergraduate Students and Information Technology (Salaway *et al.* 2007, 2008), the Higher Education in the Digital Age project in the U.S. (Harley, 2001), the HEA Pathfinder Programme<sup>1</sup>, the JISC Learner Experience Programme<sup>2</sup>, and the ESRC Net Generation Encountering eLearning at University Project<sup>3</sup>.

The results from these studies have shown evidence of sophisticated and pervasive technology use by today's young learners. Technology use has become central to students' lives (Sharpe *et al.* 2006) and a part of their education and also of their social life (Andone

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<sup>1</sup> Details of the project can be found at <http://www.heacademy.ac.uk/ourwork/learning/elearning/pathfinder>

<sup>2</sup> Details of the project can be found at <https://mw.brookes.ac.uk/display/JISCle2/About>

<sup>3</sup> Details of the project can be found at <http://www.open.ac.uk/researchprojects/netgeneration/>

*et al.* 2006; Eurostat, 2003, 2004; Livingstone & Bovill, 2001). Learners employ a range of technologies and are evidently comfortable with using technology and appropriating technologies to meet their own personal needs (Conole *et al.* 2006; Creanor *et al.* 2006). It has been noted that there is 'a profound shift in the way in which students are working' that suggests 'a complex inter-relationship between the individuals and the tools' (Conole *et al.* 2006, p.96).

In line with research into students' experience with technologies, particular attention has been given to the 'Net Generation' (Tapscott, 1998; 2009), also called 'Digital Natives' (Palfrey and Gasser, 2008; Prensky, 2001a, 2001b;) and Millennials (Howe and Strauss, 1991, 2000, 2003). Having grown up with Information and Communication Technologies (ICTs) as an integral part of their lives, these groups of young people are said to have a natural aptitude and high skill levels with technology, and they have been characterized by their familiarity with digital technologies (Oblinger & Oblinger, 2005).

Immersed in a technology-rich culture, it has been claimed that these groups of young people have developed unique skills, interests and learning preferences, which are distinct from those of previous generations (Prensky, 2001a, 2001b). Some have even gone further claiming that today's students' brains were 'physically different' (Prensky, 2001b) due to the immersion in technology. They preferred to receive information quickly, often multitasking, and have a low tolerance for lectures, preferring active rather than passive learning, and rely heavily on communication technologies to carry out social and professional interactions (Frاند, 2000; Oblinger, 2003; Oblinger and Oblinger, 2005). Commentators have claimed these characteristics raise fundamental questions about whether the current educational system is well equipped to meet the needs of this new cohort of students in the digital age (Tapscott, 2009).

Despite the considerable interest in outlining the characteristics of new generations of learners, there has been little empirical support for many of the claims being made (Bennett *et al.* 2008). Today's learners coming from a heterogeneous community represent vastly different demographic groups (Caldwell *et al.* 2006, Toman *et al.* 2005). Though there are high levels of ownership of some technologies by students and high levels of academic and recreational applications, not all young people are equally confident and able users of technology (Kvavik *et al.* 2004).

An emerging body of research (Jones & Cross, 2009; Jones & Ramanau, 2009a, 2009b; Jones *et al.* 2010; Kennedy *et al.* 2006, 2008) has begun to reveal some of the complexity of young people's computer use and skills. A significant proportion of students have a lower level of skills than might be expected of Digital Natives (Jones *et al.* 2010; Kennedy *et al.* 2006; Kvavik *et al.* 2004; Oliver & Goerke, 2007). These studies found that, although many of the students were using a wide range of technologies in their daily lives, 'there are clearly areas where the use of and familiarity with technology based tools is far from universal' (Kennedy *et al.* 2008, p. 8). Furthermore, there are also potential difference related to gender, cultural/ethnic background and discipline specialization in students' use of technologies, and the relationship between technology access, use and skill among the digital native generation (Bennett *et al.* 2008; Kennedy *et al.* 2006; Kvavik *et al.* 2004) has yet to be comprehensively investigated.

While considerable attention has been devoted to the 'Net Generation' of learners and their experience with technologies in western advanced industrialized countries, (e.g. United Kingdom, United States, Australia), little is known about developing countries in Asia such like China. While maintaining a rapid gross domestic product growth rate in recent years (CIA World Factbook, 2009), China is playing an increasingly important role in world politics and economics. With one of the world's largest number of young people

entering higher education, China's higher education system has undoubtedly faced huge pressure. Since the 1990s, the Chinese Ministry of Education has initiated a massive infrastructure programme (Liu *et al.* 2010) to encourage the use of e-learning to leverage education at all levels and in traditional campus universities, in distance-learning institutions and in rural areas for educational provision (Spencer-Oatey, 2008). Perhaps surprisingly, few empirical studies have documented university students' use of both established and emerging technologies in China.

Meanwhile, we do know that young people in China are high users of technologies, including computers, mobile phones and the Internet. According to the 23rd Statistical Report on China's Internet Development by China Internet Network Information Center (CNNIC), by 2008 270 million (90.6% of total Internet users) have access to broadband Internet and over a third (117.6 million) access the Internet via mobile devices. Web 2.0 technologies are developing rapidly, with online music (84.5%), RSS feeds (81.5%) and instant messaging (77.2%) being the three most popular Internet applications (CNNIC, 2008). According to the World Internet User Statistics (2008), China has the largest number of Internet users in the world, and young people aged between ten and nineteen comprise the largest cohort of Internet users (CNNIC, 2008). As this group of young people enter higher education, there is an urgent need for higher education institutions in China to understand how their students use technologies and to respond to the way they learn both inside and outside the classroom.

Against this background, this study sets out to explore how university students in mainland China use technologies in their daily activities and to support their learning. Drawing from the literature, it also set out to explore whether there were any relationships between students' use of technologies and their gender, year of study and discipline. The investigation focused on some of today's established and emerging technology-based tools

including: instant messaging (IM); social networking sites (SNS); blogging; wiki; RSS feeds; podcast and mobile technology. The aim was to investigate today's university students' perceptions of and use of technologies in their lives, and to explore ways in which the technologies could be harnessed for educational purposes. It was believed that a better understanding of students' attitudes, beliefs and behaviours would help guide educators to make better pedagogical changes to meet the needs of learners' in the 21st century.

## ***1.2 Research questions***

The main research question is: How do university students in China use technologies in their daily activities and to support their learning?

Developing from this main research question, there are five sub-questions:

- How do university students in China use technologies in their daily activities?
- How do university students in China use technologies to support their learning?
- Is there any variation in students' use of technologies across disciplines?
- Is there any variation in students' use of technologies across years of study?
- Is there any gender difference in students' use of technologies?

## ***1.3 Research design***

To better answer the questions, both quantitative and qualitative data were collected. While quantitative data results provided a broad scope of the range of technologies students use,

qualitative data brought insights into how and why students are using particular technologies in the way they do. Acknowledging that both quantitative and qualitative research has their strengths and limitations, a mixed-methods approach also serves as a means of data triangulation.

A large survey on students' use of technologies was the cornerstone of the quantitative data process. More than 3000 students from eighty general classes across eight disciplines at a local Chinese university took part in the study. Upon approval from the university, a paper-and-pencil survey was distributed in class to avoid bias against students who feel less comfortable filling out web forms or spend less time online and thus may have less of an opportunity to participate. The questionnaire consisted of four parts, focusing on demographic information and students' use of, skill levels with and attitudes towards a range of technology-based tools. Following the survey, face-to-face interview sessions were conducted with selected student volunteers. Two groups of students were selected from each of the departments covering both lower year (year one to two) and higher year (year three). The aim was to provide an opportunity for students to share their accounts and bring insights into their individual experiences with technologies both for learning and for leisure. The detailed data collection procedure including a justification of the methodology and setting of the study will be provided in sections 4.3-4.5.

## ***1.4 Pilot study***

Before the main study, a pilot study was conducted during February 2009 with students at University B. Two hundred students from a third-year educational technology course in the Department of Social Science were invited to take part in the pilot. One of the objectives of the course was to make students aware of the educational potential of the new technologies



and to actively engage in the use of these resources in their teaching and learning. A questionnaire of students' demographic features, access, self-reported skill levels and experience with a range of technology based tools was administered through the Internet. Upon approval from the teachers in charge, a Chinese version of the questionnaire was uploaded to University B's central survey service. Invitation letters, including description of the project, contact details of the researcher and a link to the web survey were given to the students by their teachers during the class. In total, 63 students completed the online questionnaire.

The pilot showed that the overall design of the questionnaire was feasible and helpful in answering the research questions. It gave me an excellent opportunity to try out the instrument and improve on the data collection strategies for the main study. In particular, the pilot study explored whether the questionnaire was feasible in implementation and to what extent it could achieve the goal of the study. It also provided me with practical experience of conducting educational research with Chinese university students.

Furthermore, interesting preliminary results were generated from the pilot and new problems which could be explored further in the main study were identified. Meanwhile, some good practice was discovered during the pilot and thus maintained for the main study. For example, gaining support from the department and the teachers had a markedly positive role in increasing the students' participation rates. The detailed results and implications of the pilot study are reported in section 4.6.

## ***1.5 Main study***

The main study was conducted at University A<sup>4</sup> from May to July 2009. Both quantitative and qualitative data were collected. While quantitative data sought to answer the broad

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<sup>4</sup> University A remained anonymous

question of what technologies students use, the qualitative data sought to explain how and why they used particular technologies. In all, 2920 students across eight disciplines (Electronics and Information Engineering; Computing and Information Technology; Pre-school Education; Civil Engineering; Art and Design; Economics and Management; Mechanics and Automation; Foreign Languages) and three year levels (Year 1 to 3) completed the survey and 29 student volunteers participated in the follow-up focus-group interviews. Section 4.4 details the setting of the study and the sampling strategy.

Quantitative data analysis began with the coding and entering of 2920 cases with 179 variables for each case into SPSS 17.0. First, descriptive statistics such as frequencies and means were carried out to understand basic characteristics of the participants. Next, factor analyses were used to identify common underlying dimensions (factors or key concepts) in the survey. Variables were grouped into a manageable number of factors which were then analyzed and aggregated to determine a factor score. Three orders of factor analysis were carried out to explore the broad dimensions of students' use of technology and confirmed that the scale items in the questionnaire were measuring the dimensions of students' experiences of ICT in aspects of their use of ICT, their competence levels with ICT and their attitudes towards ICT as originally planned.

Multivariate analysis of variance (MANOVA) was then carried out to test the relationship between constructs or variables obtained from the factor score, as proposed in the research questions, namely whether students' use of ICT varied with age, discipline, year of study, and gender. Follow-up univariate tests were also carried out to explore the origins of these effects. Meanwhile means scores were calculated to show how students differed on each of the effects. Because of the large number of statistical tests that were carried out, a threshold probability level (alpha level) of 0.01 was used to avoid spuriously significant results (Type I errors). Because of the large sample size, the results might be statistically

significant but of little theoretical or practical importance. Partial eta squared was used as a measure of effect size. Cohen (1988, pp. 285-287) suggested that proportions of explained variation of 0.0099, 0.0588 and 0.1379 would constitute small, medium and large effects, respectively.

The qualitative interview data were analyzed using thematic analysis (Braun and Clarke, 2006), which involved a constant reading of the data set to familiarize myself with the data, generating initial codes, searching for themes (repeated patterns of meaning and issues of potential interest), reviewing themes, defining and naming themes and relating back of the analysis to the research questions and literature.

In all, six themes were generalized from the students' interviews in alignment with the research questions.

- How do students use today's technologies (an overview of students' use of technologies by tools)?
- How do students use technologies for social and leisure purposes (specifically addressing research question 2)?
- How do students use technologies to support their learning (specifically addressing research question 3)?
- What do students think of these technologies (students' attitudes to the use of ICT at university)?
- Why do they use some specific tools more often than others (students' experience with specific tools)?

- How do their experiences with technologies change with years of study (year 1, year 2 and year 3) (supportive evidence for research question 4)?

A detailed description of the data analysis process and a justification of the analytical framework are presented in section 4.7.

## ***1.6 Main findings***

Despite the general claims made about the Net Generation, the results suggest that university students in China do not possess a natural aptitude and competence with technology. There is no evidence of a single new generation of young students at university, and their experience with technologies varied considerably even within the same age group. Demographic factors such as gender, discipline and year of study interact with age to influence students' experiences with technologies.

The complex changes that are taking place in the student body is most obvious with the use of IM, SNS and the use of mobile devices to access Internet. Students' use of more recent web 2.0 technologies (e.g. social bookmarking, RSS feeds, micro-blogging) is still in its early stages, although their current low use does not imply that they are not appropriate for educational use or that they will not become mainstream in the near future.

Students mostly use ICTs for social and entertainment purposes, rather than for learning. Nevertheless, students persistently report that they prefer moderate use of ICTs in their courses. In some ways the inconsistency between students' preferences of ICT use in course and their actual low level of usage is determined by the lack of requirements that

the university places upon its students to make use of new technologies and the way ICTs have been integrated into their courses.

There is no evidence of a consistent demand from students for instant changes of provision or pedagogy at university. Students generally respond positively to the teaching and learning strategies that they encounter at university.

## ***1.7 Overview of students' use of technologies***

Computer ownership and Internet access were surprisingly low among the students, with only less than one fifth of the student population being surveyed owning either a laptop or a desktop. Most students accessed computers and the Internet at the university's computer rooms or in Internet cafés. The data on Chinese university students' ownership of computers provided a clear contrast to findings from the United Kingdom (Jones *et al.* 2010; Margarayan and Littlejohn, 2009), the United States (Salaway *et al.* 2008) and Australia (Kennedy *et al.* 2008). For example, three quarters of the students owned a laptop and over a third owned a desktop in UK universities (Jones *et al.* 2010).

Nevertheless, while over two thirds of those asked in the United Kingdom (Jones *et al.* 2010) felt that their access to computers was sufficient to meet their needs, the interviews in the present study equally showed that most students said their computer access mostly met their needs.

A majority of the students spent less than three hours per day on a computer and most of them spent less than one hour. Mobile phones were one of the most owned forms of technology amongst the respondents, though not yet universal. The majority of students made heavy use of their mobile phones to call or text people on a daily basis. Students also

made most use of their mobile phones as MP3 players, cameras, data storage devices and even book readers. An increasing number of students are starting to access the Internet via their mobile phones, though only a few sent emails through mobile phones. This corresponds with evidence from a study in the USA (Smith and Caruso, 2010) where there has been a rapid growth in the use of mobile Internet in recent years.

Unlike the United Kingdom and other European countries where email is dominant at universities, email was not frequently used among the students. Though many of them had email accounts, they were seldom used. Students claimed there were not many occasions where they were required to use email, or as part of their courses.

Basic work applications such as Office programmes, Excel, and search engines are widely used among students; however, not all of them are equally competent in using them.

Listening to music, watching videos and browsing photos was one of the students' favorite online activities. However, only a small number had edited audio or video files on a computer, and fewer had uploaded audio/video files. With regard to gaming, mobile phone games were more popular than online browser-based games and multiplayer video games.

IM and SNS were also popular among students. Almost everyone had a QQ (a local Chinese IM service) account and they used it from several times a day to once every few weeks. Similarly, the majority of the students used SNS frequently, and some even had accounts with two or more different social networking sites, including Xiaonei (also called Kaixin or Renren), Kuwo, 51.com, myspace etc.

Though technologies played a significant part in students' daily activities, they were mainly used for social and entertainment purposes. For many of the students, computers

and the Internet had become a form of 'play'. They spent a lot of time on the Internet to relax and entertain themselves rather than for learning purposes. Computers and the Internet had not been fully integrated into the university system such that students saw computers as a 'luxury' to be added if it is core to their subject area. Most students viewed computers and the Internet as being independent from formal study.

Nevertheless, the results indicated that there may be a need for a central Virtual Learning Environment (VLE) or Course Management System (CMS) infrastructure at university, on which lecturers would post their slides and additional notes, images etc so the students could access them when they chose. For instance, many students would come to the instructor and copy Powerpoint presentations from the instructor's computer after class, so that they could review the materials afterwards. In addition, instructors would sometimes set up a group email account for the whole class and share courseware via email.

Despite the growing media attention from the west and the predictions of commentators who suggested that many of the Net Generation were actively engaged in the process of information and knowledge creation (Lorenzo, Oblinger & Dziuban, 2007), the results showed that students' use of recent web 2.0 technologies, including social bookmarking, RSS feeds, and micro-blogging was still in its early stages. More than half of the students surveyed had never used a micro-blogging service, such as Twitter, before. Similarly, a considerable number of students had never used an RSS feed or contributed to wiki sites before. This adds to results from the United Kingdom (Jones and Cross, 2009) and Australia (Kennedy *et al.* 2008), where students' use of Twitter, RSS feeds and wikis seem to be in the startup phase.

Students' attitudes to participation contrasted with the rhetoric around web 2.0. One of the most evident features of web 2.0 sites is that it encourages users to interact and collaborate with each other in a virtual community as creators of user-generated content, in contrast to traditional web 1.0 websites where users are limited to the passive consuming of content that was made for them. Consistent with studies in the United Kingdom (Margaryan *et al.* 2011) and Hong Kong (Chu, 2010), most of the students being studied were passive information consumers instead of active information creators. They used Internet services such as Wikipedia or Baidu-pedia (a local Chinese program offering similar service to Wikipedia) to search for information but few students had ever engaged in contributing to the general knowledge pool. Students who were actively viewing or downloading from video-sharing sites (e.g. Youku or Tudou) largely outnumbered those who uploaded their own generated content. Students made very little use of collaborative knowledge creation tools and only a small percentage of students were engaged in creating content on the web.

Nevertheless, living in a technology-rich environment, students' problem solving and new knowledge acquisition skills do seem to be distinct from old times when everything is in pen-and-paper. When facing technical problems, the majority of the students would try to solve the problems on their own or by learning from peers. Asking for help from their teachers would be the last resort. In comparison with learning from texts, many students preferred to learn from videos as they found it easier to follow and understand than pure texts.

### ***1.8 Interactions with age, gender and discipline***

Statistical analyses showed that age had a significant effect on students' use of ICT. The younger the students were, the more they tended to use ICT, in particular use of interactive



technologies and use of office software. Although there was no significant impact of age on skill levels with ICT overall, age was associated with students' skill levels with interactive technologies and office software: the younger the students were, the better skill levels they tended to have with interactive technologies and office software. Nevertheless, according to Cohen's recommendation on proportions of explained variation, the effects of age were of little theoretical or practical importance.

In comparison, discipline proved to be a more important factor than age on students' use of ICT and skill levels with ICT. Across disciplines, students in Computing and Information Technology possessed both the highest access and skill levels with ICT, with students in Arts and Design followed next. In comparison, students in Education tended to have the lowest use of ICT and lowest skill levels with ICT. With regard to attitudes to ICT, there was not much variance across disciplines, students in Arts and Design had the most positive attitude while students in Education had the lowest attitude towards ICT. With regard to aspects of use of ICT, discipline had a significant effect on all aspects of access apart from use of digital photography.

Year of study had a significant effect on use of ICT, while no significant effect was found on attitude or skill levels with ICT. As students went through university, their use of ICT increased in all aspects, including, use of blogging, interactive technologies, learning technologies, social networking, office, digital photography, skill levels with blogging, and skill levels with interactive technologies. In particular, there was a big leap from the first year to the second year. According to Cohen's (1988) recommendation on size of effect, the effect of year of study on use of ICT was approaching medium. In other words, year of study had more theoretical and practical importance for use of ICT than age or discipline. Given that the effects of age and the other independent variables had already been

controlled, I could tell that the effects of year of study were not a result of age difference but more a result of the different curriculum.

Finally, gender also showed a significant effect on students' use of ICT and skill levels with ICT, but not on attitudes to ICT. Men tended to have both better access and skill levels with ICT than women. The effect of gender had an even larger effect size on use of ICT than on skill levels with ICT.

## 1.9 Implications

Despite the wide claims about Net Generation (Tapscott, 1997; 2009) and Digital Natives (Prensky, 2001a; 2001b; 2009) students and the insistent demand that universities make radical changes to their infrastructure, curricula and pedagogical models to cater for the needs of the new population of students, the results of the study suggest that young students in China do not fit neatly into the stereotype of the 'Digital Native'. These students do not form a homogeneous generational group in relation to access, competence levels and experiences with technologies, which vary considerably. While there are students who use technology in a wide range of ways, there are still a significant number of students who are not participating in activities that are typically associated with the generational argument. One cannot assume that being a member of the 'Digital Natives' is synonymous with being naturally capable and confident with technologies.

University teachers and educational practitioners should pay greater attention to the variety within the student body rather than focusing on the claims of a systematic generational gap between teachers and the student body. Given the diversity of the new generation of students, a 'one size fits all' approach can no longer be adopted. To develop appropriate

policies towards digital culture, we need to better understand the characteristics of these new generation of students and to provide more empirical evidence on students' actual technology practices and perceptions.

### ***1.10 Contributions and limitations***

In response to the numerous calls that have repeatedly emphasized the necessity of conducting empirical research that would enhance a body of knowledge called Net Generation and Digital Natives (Bennett *et al.* 2008), this study provides a stepping stone for research on Chinese university students' use of technologies in relation to the Net Generation discussion. As one of the first empirical surveys of university students examining the Net Generation in the context of mainland China, this thesis contributes to filling the gap in the study of Net Generation university students and their use of ICTs in China. Bearing in mind the inherited limitations of self-reported data and acknowledging the varied methods to investigate students' everyday use of technologies, e.g. usage logs and Day Experience, it would be interesting to re-investigate the issue using other alternative methods in the future, and compare the results with the current findings.

# **Chapter 2 Literature Review on the Net Generation**

## ***2.1 Introduction***

After providing the general background of research into students' experience of technology, this chapter focuses on the discussion on the Net Generation (also called Digital Natives, 'Generation Y', Millennials) and their use of technologies at university. Section 2.2 briefly introduces the generational theory, followed by section 2.3 where the competing terms around the Net Generation discourse are presented. Finally, section 2.4 reviews the empirical studies on Net Generation university students across different countries.

## ***2.2 Generational theory***

Generally speaking, generations are categorized by age. Age as an indicator of generation might help to describe and simplify our understanding of our complex society.

Nevertheless, it does not help to explain the reasons underlying the segmentation. As a way of segmentation and making generations of people born between certain dates, generational theory (Codrington & Grant-Marshall, 2005) postulates that the year a person was born affects the development of their value systems and views of the world, particularly in terms of significant events that happened in one's early ages and adolescence. In other words, 'generation' refers to a cluster of people born in a similar period of time, who experienced similar social and cultural events (e.g. war, civil conflict or natural catastrophe) during their adolescent or early adulthood years, which has shaped their values, attitudes and life styles in a certain way that remains with them for their whole lives (Rogler, 2002; Schewe & Meredith, 2004).

Events produce generations (Mannheim, 1952). Mannheim stressed the role of traumatic historical events in creating a generational consciousness. While any kind of historical event might shape generational consciousness, traumatic events such as warfare seem to be fundamentally important to the creation of generations. Thus, events such as the First World War, the Russian Revolution, Middle East War, the Vietnam War and the Second World War have all shaped the political consciousness of different generations and determined their objective possibilities.

Accordingly, Egri and Raltson (2004) argue that an individual's basic values could reflect the socioeconomic conditions of the society during their childhood and adolescence years. Similarly, characteristics of a particular society could also help to explain the different values, life styles of its generational cohort. As Chen (2008) put it, 'generations growing up during periods of socioeconomic and physical insecurity (e.g., social upheaval, war, and economic distress) learn modernist survival values (e.g., economic determinism, rationality, materialism, conformity, and respect for authority). By contrast, generations growing up during periods of socioeconomic security learn postmodernist values (e.g., egalitarianism, individualism, interpersonal trust, tolerance of diversity, self-transcendence)' (p.5).

Based on the classical Mannheimian (1952) theory of generation, Edmunds & Turner (2002) examined the contemporary relevance of the theory and proposed the rise of 'global generations' sustained by mass media sources with an international reach. The contention was that local events received worldwide coverage. Traumatic events, trends, icons, or popular consumer products mediated by global media coverage became so widely known, that they collectively form a dimension of global youth culture. For example, McDonald's, Hollywood or World Cup football tournaments became part of the global youth experience. The rise of the international communication network made it possible for young people from different parts of the world and backgrounds to interact and share common interests;

as Edmunds and Turner (2002) put it, ‘In historical terms, past generations were typically local and specific, but global communication makes possible the rise of a new cultural phenomenon, global generational consciousness’ (p.viii).

Arguing that with globalization generations could cut across national boundaries, Edmunds and Turner (2002) named the 1960s the first global generation. Their argument was that this was because they had the opportunity to transmit messages globally through electronic media (e.g. television) rather than the traditional mechanical forms of communication (McLuhan, 1964). They shared global music, consumerism and communication. This was a time when rock and roll music from the United States became popular in Europe through TV. However, the same trend might not apply to marginal groups (Edmunds and Turner, 2005). The question was how far the global culture extends to countries outside the western context. The account of a global generation seemed to fail to take into account countries outside North America, Canada and Europe. In accordance, the 1960s generation was not a truly ‘global’ generation in a sense that it was largely a western phenomenon, or in other words, more advanced industrial countries like the United States and the United Kingdom.

Generational theory was a useful approach to facilitate understanding of a group of people on a macro level. Nevertheless it ran the risk of oversimplification. Individuals within a generation were shaped by many other factors such as their culture and socio-economic background. One could not assume that the general qualities of the generation can apply to each individual. Even those with relatively homogeneous experience might have characteristics atypical of their generation (Dede, 2005; Halse and Mallinson, 2009; Mannheim, 1997). Later, I introduced Howe and Strauss on generations and how their generational idea feeds into their notion of Millennials and then the idea of a Net Generation, details can be found at section 2.3.1.

## 2.3 Competing terms

Authors such as Tapscott (1998, 1999, 2009), Howe and Strauss (1991, 2000, 2003), Prensky (2001a, 2001b, 2009), Oblinger and Oblinger (2005), Palfrey and Gasser (2008) and others argued that because today's generation of young people had been immersed in a networked world of digital technology, they behaved differently from previous generations. They thought differently, they learnt differently, and they held different social characteristics and expectations about life and learning. Some even went further, claiming that today's students' brains were 'physically different' (Bavelier *et al.*, 2010; Prensky, 2001b) due to the immersion in technology. They preferred receiving information quickly, often multitasking, and had a low tolerance for lectures, preferred active rather than passive learning, and relied heavily on communication technologies to carry out social and professional interactions (Frاند, 2000; Oblinger, 2003; Oblinger and Oblinger, 2005).

There are a number of competing terms that are used to identify this new generation of young people who have been brought up in a digital rich environment. The most common terms are the 'Net Generation' (Tapscott, 1998, 2009), 'Digital Natives' (Prensky, 2001a, 2001b, 2009), 'Generation Y' (McCrindle, 2006; Weiler, 2005) and 'Millenials' (Howe & Strauss, 1991, 2000, 2003). They are also referred to (albeit less often) as the 'IM Generation', which referred to the Instant Message Generation (Lenhart *et al.* 2001), the 'Gamer Generation' (Carstens & Beck, 2005) for the obvious reference to video games, or even the 'Homo Zappiens' (Veen, 2003) for their ability to control information flows. Each of these definitions carries some special characteristics and varies slightly among different researchers, but in general they could be used interchangeably. Table 2.1 provides a brief summary of the important terms associated.

Table 2.1 Terms and sources

Terms	Typical Source	Birth Dates
Millennials	Howe and Strauss (1991, 2000, 2003)	Between 1982 and 2001
Net Generation	Tapscott (1998, 2009)	Between Jan 1977 and Dec 1997
	Oblinger and Oblinger (2005)	Between 1982 and 1991
Digital Natives	Prensky (2001a, 2001b)	Undefined
	Palfery and Gasser (2008)	Born after 1982
Generation Y	AdAge magazine (1993)	Ranging from the mid 1970s to the mid 1990s

### 2.3.1 Millennials

In 1991, Howe and Strauss published their book *Generations*, describing American history as based on recurring generational stereotypes. In the book, Howe and Strauss (1991) first coined the term ‘Millennial Generation’ (born between 1982 and 2000), as the successor to, but not wanting to be associated with, the ‘Generation X’ (also called the ‘13th Generation’, born between 1961 and 1981). Following that book, Strauss and Howe (1993, 1997) published two further books expanding on their idea of generations. In 2000, Howe and Strauss (2000) published *Millennials Rising: The Next Great Generation*, describing those born after 1982 and thus graduating from high school in the United States at the turn of the millennium. ‘Millennials’, as the authors argued, are distinctly different from Generation X as a result of a combination of circumstance, timing and temperament, particularly the attention they received from the media, technology and politics. According



to Howe and Strauss (2003), these individuals were ‘optimistic, team-oriented, high-achieving rule-followers’ (p.1).

Based on Howe and Strauss’ (2000) concept of the ‘Millennials’, Oblinger (2003) argued that these new characteristics had created an imbalance between students’ expectations of the new learning environment and what they actually found in universities and colleges. As a result, universities and colleges need to understand these new learners and adapt their approaches when designing programmes and courses. Oblinger and Oblinger (2005) gave birth dates to the Millennials (also used the term Net Gen, as seen in section 2.3.2), born between 1982 and 1991. However, they also acknowledged that, although they described the trends in generational terms, ‘age may be less important than exposure to technology’ (p.20).

### **2.3.2 Net Generation**

A few years after Howe and Strauss (1991) coined the term ‘Millennials’, Tapscott (1997), a consultant on the application of technology in business and society, published his book *Growing Up Digital: The Rise of the Net Generation*, in which he commented on the social and business impact of the digital generation come of age. In that book, Tapscott coined the term ‘Net Generation’, referred to young people who had grown up surrounded by digital media. Later, Tapscott (2008) gave a date that classified the ‘Net Generation’ as those born between January 1977 and December 1997. According to Tapscott (1997), the reason he called young people grown up during this period the ‘Net Generation’ was because the most significant change affecting this generation is the rise of the computer, the Internet and other digital media. He perceived that ‘the New Generation is exceptionally curious, self-reliant, contrarian, smart, focused, able to adapt, high in self-

esteem, and has a global orientation...there has been a change in the way children gather, accept and retain information' (p.2). He asserted that a generation of technology advanced students would be arriving at university and posing radical demand on traditional teaching and learning. Although such claims might appeal to our commonsense perceptions of a rapidly changing world, there was no evidence that young people had developed universal characteristics that made them different from previous generations.

### **2.3.3 Digital Natives and Digital Immigrants**

In 2001, another term to describe this generation came from Prensky (2001a), who named this group of young people 'Digital Natives', because he found them to be 'native speakers' of the digital language of computers and the Internet. Since then, the terms 'Millennials', 'Net Generation', 'Generation Y', 'Digital Natives' have become interchangeable. According to Prensky (2001a), Digital Natives were distinct from previous generations and had developed new attitudes, aptitudes, and learning styles. He argued that the emergence of Digital Natives had led to an entire generational change, which had been caused by a process of technological advancement. In a second article, Prensky (2001b) further claimed that Digital Natives' brains were 'physically different' from previous generations' as a result of the input from the digital technologies they had received growing up.

In contrast to 'Digital Natives', those who were not born in the digital world and who had only adopted the new technologies later in their lives were called 'Digital Immigrants' (Prensky, 2001a). Unlike Digital Natives, Digital Immigrants had to learn and adapt to using emerging technologies rather than seeing them as natural tools as a part of their world. According to Prensky, no matter how well Digital Immigrants adapt to the new

environment, they retain their ‘digital immigrant accent’. He also expressed a concern over the profound gap between the Digital Natives’ students and their instructors’ technological literacy, claiming that to be ‘the biggest single problem facing education today’ (p.2). The characteristics and learning preferences of Digital Native students were incompatible with the teaching practices of their instructors. As this generation of young people entered higher education, educators needed to change their teaching approaches in order to meet the needs of these new generation of learners (Prensky, 2001a); as he put it, ‘Our students have changed radically. Today’s students are no longer the people our educational system was designed to teach’ (p.1).

Given these strong claims by Prensky (2001a, 2001b), it was surprising that he did not give any specific age ranges of this generation of the Digital Natives. On the other hand, Palfery and Gasser (2008) framed Digital Natives as a generation born after 1980, who had access to networked digital technologies and strong computer literacy. Unlike Prensky’s (2001a, 2001b) notion of the Digital Natives, Palfery and Gasser’s (2008) recognized that ‘Digital Natives share a common global culture that is not strictly defined by age but by certain attributes and experiences related to how they interact with information technologies, information itself, one another, and other people and institutions’ (p. 346).

### **2.3.4 Generation Y**

The term ‘Generation Y’ first appeared in an *AdAge* magazine in 1993 (Zhao and Liu, 2008; Halse and Mallinson, 2009), where they described teenagers born between 1980 and 1995. As a subculture of U.S. society, ‘Generation Y’ was a succession from Generation X (Coupland, 1991), composed of children of Baby Boomers - those born in the years after the Second World War. There were no agreed dates for when this generation started and

ended: researchers have generally used birth dates ranging from the mid 1970s to the mid 1990s (Jorgensen, 2003; Noble *et al.* 2008; Weiler, 2005). The population size of ‘Generation Y’ in the United States was between 60 and 80 million (<http://www.infoplease.com/ipa/A0005067.html>), about the same size as the population of Baby Boomers and three times larger than Generation X (Chen, 2008).

Growing up in a digital world and a period of economic expansion, ‘Generation Y’ was the most well-educated, media and technology savvy cohort (Jorgensen, 2003; Noble *et al.* 2008; Wolbug & Pokrywczynski, 2001). They were said to have developed unique generational characteristics, attitudes and life styles that were different from those of previous generations (Wolburg and Pokrywczynski, 2001). They had strong sense of responsibility, were good at collaborating and networking, had an open attitude to marriage, had strong purchase power and were comfortable with change (Chen, 2008; Noble *et al.* 2008; Tulgan & Martin, 2001). Digital gadgets such as personal computers, mobile phones, iPods and game consoles were not only the necessary communication tools but had also become icons of their generational identity (Huntley, 2006).

### **2.3.5 Digital wisdom**

Recognizing that the Digital Native/Digital Immigrant distinction might be less relevant as society moved further into the 21st Century when all would have grown up in a digital age, Prensky (2009) proposed a new term ‘digital wisdom’. Unlike the digital native-immigrant metaphor, digital wisdom transcended generational boundaries. Even though the digital immigrants could not become Digital Natives, they could acquire digital wisdom through interaction with technology. Arguing that technology could make us ‘not just smarter but truly wiser’ and that the ‘brains of those who interact with technology frequently will be

restructured by that interaction' (p.1), Prensky (2009) described how the digital technology that helps us process information and enhancing our analytical skills reshapes what wisdom is and enhances our cognitive capability.

Digital wisdom, according to Prensky (2009), refers to recognition of both the digital and the wise. The digitally enhanced person who will emerge from this development, 'homo sapiens digital', differs from today's human in two key aspects: 'He or she accepts digital enhancement as an integral fact of human existence, and he or she is digitally wise, both in the considered way he or she accesses the power of digital enhancements to complement innate abilities and in the way in which he or she uses enhancements to facilitate wiser decision making' (Prensky, 2009, p. 3-4).

The brains of wisdom seekers of the future would be fundamentally different from our brains today. Future digitally enhanced humans would be able to achieve today's level of wisdom without the cognitive affordance. However, today's level of wisdom would not be sufficient for the digitally unenhanced person to navigate around a complex technologically advanced world (Prensky, 2009).

### **2.3.6 Digital melting pot**

In alternative to the Digital Native/Digital Immigrant dichotomy, Stoerger (2009) proposed a new metaphor, 'the Digital Melting Pot', in an attempt to redirect the attention away from the 'assigned' generational characteristics to the individual's diverse technological capabilities but also to focus on the digital skills they might gain through experience.

The Melting Pot metaphor emphasized the integration of the Digital Natives with the Digital Immigrants rather than their segregation. According to Stoerger (2009), the Digital Melting Pot symbolized the bridge between the Digital Native/Digital Immigrant dichotomy. The melting pot metaphor suggested that, by gaining technology experience, those with low levels of competency could be transformed into the tech-savvy. Educators, during this assimilation process, could play significant roles in guiding individuals and providing them with the opportunity to acquire and enhance technological skills.

### ***2.3.7Skepticism about the Net Generation discourse***

Critical voices against the Net Generation claims have been heard in the United States (Hargittai, 2010a, 2010b), the United Kingdom (Bayne & Ross, 2007; Jones & Czerniewicz, 2010; Jones, 2010), Australia (Bennett *et al.* 2008; Bennett & Maton, 2010), Germany (Schulmeister, 2008), and South Africa (Brown & Czerniewicz, 2010). One of the criticisms against the Net Generation was that the discourse has largely been influenced by non-academic research which has not been through the process of academic peer review. Without the authors disclosing important methodological details or potential conflicts of interest, it is often difficult to assess the quality of the research. For instance, Tapscott (1997, 2008) and Palfrey and Gasser (2008) claimed to have conducted research to support their claims. However they did not provide sufficient methodological detail in their reports to allow for a reasonable assessment of how valid and reliable their research and conclusions are (Bullen, Morgan, Qayyum, Belfer, and Fuller, 2009). There is a need to identify robust empirical evidence to substantiate the debate (Bennett & Maton, 2010; Bennett *et al.* 2008).

Schulmeister (2008) provided a critical analysis of the speculation regarding the Net

Generation from five perspectives: generation; the use of media; the motivation for the use of media; socialization; and student responses and university didactics. He concluded that many of the claims were overstated or unsupported.

***Generation.*** The members repeatedly prove to be a mixture of groups with various interests, motives, and behaviours, never a group of students with common characteristics.

***The use of media.*** After examining more than fifty international studies of media use, he found that studies examining the use of computers do not always distinguish between the types, contents or functions of the media activities or anything about the motives of the users (e.g. active information creation versus passive information consumption).

***The motivation for the use of media.*** The age distribution of young people's preferences suggests that their interests are actually influenced by socialization. Today's young people who have grown up with the new media regard them as no more remarkable a concomitant to their normal daily lives than earlier generations regarded other media in their days.

***Socialization.*** 'The media behaviour of today's youth centres on the all-too-human questions that occupied young people before the advent of today's media' (section 6, para.1). The need of youth determines the choice of the media. The young take up the media the way they require to satisfy their needs.

***Student responses and university didactics.*** Despite the high uptake of media, today's students prefer a moderate use of media as a teaching device and they value live

teaching highly. ‘Active self-determined participation required by Web 2.0 is only pursued by a minority of students’ (para.9).

Furthermore, Bennett & Maton (2010) suggested that, rather than simply regarding all young people as ‘Digital Natives’, research was required into what young people chose to do with technology and why they engaged according to the context. They argued for new ways of conceptualizing key ideas to advance understanding of the debate, using Castells’ notion of ‘networked individualism’, Bourdieu’s interconnected concepts of ‘field’, ‘capital’ and ‘habitus’, and Bernstein’s theory of the forms taken by knowledge. These concepts served as a theoretical lens through which they sought to build a more sophisticated understanding of young people’s technology experience.

## ***2.4 Empirical studies on Net Generation students across countries***

While there was a considerable interest in addressing the characteristics of this new generation of learners and their learning preferences, there was little empirical basis for many of the claims being made. Despite the widespread acceptance that technology should be playing an increasingly prominent part in today’s education to suit the needs of today’s young people, there was a growing sense amongst researchers that this intervention in higher education had been predicated on little more than assumptions about the likely educational benefit of technology and a supposed universal student passion for technology. As Broad *et al.* (2004) observed from UK institutions, much of the initiative behind the integration of the Internet into higher education had been driven by ‘internal political pressure’ on universities and academic departments rather than empirically sound evidence (p. 137). Others argued that the Digital Natives debate can be likened to ‘an academic form



of moral panic' (Bennett *et al.* 2008). After a critical review of the literature, Bennett *et al.* (2008) concluded that there was no evidence to suggest that this was a 'new phenomenon exclusive to digital natives' (p.5).

In an attempt to ground the Net Generation debate in evidence, this section reviews the empirical studies on university students' use of technologies across different countries, including the United State, Australia, United Kingdom, Canada, South Africa, Hong Kong and some other European countries. Empirical evidence repeatedly proved that today's young students is a mix group with different beliefs, interests and behaviours, which could not simply be represented by common characteristics.

### **2.4.1 United States**

In 2002 the Pew Internet and American Life Project (Jones, 2002; Lenhart *et al.*, 2005; Jones & Fox, 2009) began investigating the Internet's impact on college students' daily lives, as well as on their academic and social routines. It was one of the first projects to document that a high proportion of U.S. college students use Internet and computer technologies to access information and to communicate with friends and fellow students to assist with their studies. Data were collected from three main sources: a large survey of students from year two to four in twenty seven U.S. colleges and universities; ethnographic observations of life in ten Chicago area institutions; and survey findings of American's use of the Internet conducted in 2001 and 2002 for the project. According to Jones (2002), the demographic features of college students in 2002 had not changed much from the previous decade, but one character that set them apart was their familiarity with the Internet. One fifth of the 18-year-old college students surveyed began using a computer between the ages of 5 and 8, and half of them had accessed the Internet before college. Online penetration

among college students (86%) was much higher than among the general public (59%).

College students led other Internet users in activities such as music downloading, file sharing, instant messaging and online chatting. Jones further argued that use of the Internet had become part of college students' daily life and was firmly embedded in their communication habits. Today's college students had grown up with technologies. Students used the Internet as much for social communication as they did for education. They used the Internet to communicate with friends and professors, to do research and to access library materials. Nearly four-fifths of college students surveyed agreed that Internet had a positive impact on their academic experience.

Similarly, Lenhart *et al.* (2005) argued that teenagers in the United States used the Internet more often and in a greater variety of ways than they had in 2000: 87% of U.S. teens aged 12 to 17 used the Internet, and half of them used the Internet daily. Half of U.S. families with teens had broadband. Teenagers used instant messaging extensively, and one third of all U.S. teens used instant messaging (IM) on a daily basis. Apart from using IM frequently, there was also an increase in other online activities, for example playing online games (81%), watching news (76%), purchasing online (43%) and seeking health information (31%). Nevertheless, while teens had a passion for new technologies, traditional landlines remained the most popular choice for communication in their daily life. With regard to their preference for communicating with friends, half of the teens (51%) surveyed prefer using landlines, one fifth (24%) often used instant messaging, one tenth (12%) preferred to call their friends on a mobile, a small number (5%) opted for emails, and only a fraction (3%) used text messages. Despite the increase in access, there were also approximately three million teenagers in the United States who did not use the Internet. The digital divide was still a serious issue in contemporary U.S. society. As Lenhart *et al.* (2005) put it, 'those teens who remain offline are clearly defined by lower levels of income and limited access to technology' (p. 2).

However, contrary to the image of the Net Generation, Jones and Fox (2009) proposed that teenagers were not the only ones dedicated to technology: as they put it, ‘internet users in their 20s do not dominate every aspect of online life’ (p. 1). This conclusion was based on results from a series of telephone interviews conducted between August 2006 and August 2008 in the United States. While younger generations continued to dominate the Internet, a larger percentage of older generations were more engaged in online activities than in earlier years. ‘Generation Y’ (Net Generation) were the most likely to use the Internet for social and entertainment purposes. Generation X (born 1965-1976) were the most likely to search for information, to buy products and to look for health information online. Boomers (1946-1964) made travel reservations online. Even older generation (born 1937-1945) were active in using emails.

Correspondingly, another point that often got neglected when talking about the digital native/immigrant is that the technological environment that the Digital Natives use and inhabit did not come from nowhere; as Stoerger (2009) put it, it’s the so called digital immigrants who ‘had to design, build, and upgrade the technologies that have evolved into the electronic space that the natives now inhabit’ (para.22).

Since 2004, the annual ECAR Study of Undergraduate Students and Information Technology had sought to shed light on how university students use technology in and out of their academic world. The 2010 study (Smith *et al.* 2010) is a longitudinal extension of the 2004, 2005, 2006, 2007, 2008, 2009 ECAR studies (Kvavik *et al.* 2004; Kvavik & Caruso, 2005; Salaway *et al.* 2006; Salaway & Caruso, 2007; Salaway & Caruso, 2008; Smith *et al.* 2009). It was based on a quantitative survey of 36950 students from 100 U.S four-year institutions and 27 Canadian two-year institutions; focus groups from 84 students from 4 institutions; and it includes a review consolidating the previous years’ research. The

report suggested that undergraduate students might well become early adopter of cloud computer as the move assisted by institutions which have already adopted cloud-based applications such as Google Apps Education and Microsoft Live@edu. A second trend identified in the report was the rapid growing use of Internet on handheld devices. Thirdly the continuing use of social networking sites (SNS).

Regardless of the specific technologies under investigation, the 2010 report (Smith *et al.* 2010) on technology and college experience confirmed the previous years' results on students' self-perceived technical skills and perceptions regarding the use of ICT. About half of the students identified themselves as mainstream adopters. The ECAR report map student responses into five categories: innovators, early adopters, mainstream adopters, late adopters and laggards. Student responses were reported to be consistent over the years and the responses roughly form a bell curve distribution. There was a persistent gender gap, with half of the male students identifying themselves as innovators or early adopters versus only a quarter of females doing so. With regard to students' self-perceived skill levels, more than 80% considered themselves expert or very skilful in searching the Internet while more than half (57%) rated themselves as expert or very skills in assessing the credibility and reliability of online information.

Internet on handheld devices were reported to be growing with two-thirds in 2010 owing one of these Internet-capable handheld devices and about half of the 2010 respondents used them daily to access Internet, up from about a third in 2009. It was only in the 2006 survey that smartphones had made an appearance with 7.5% reporting ownership, up from just 1.1% in the year before (Salaway *et al.*, 2006). Almost half of the respondents who owned a Internet-capable handheld device used it to access Internet and more than 8 in 10 of them used it to check for information and access e-mail.

The use of web 2.0 technologies remained low but many contributed to blogs (36%), uploaded videos (42%) and updated wikis (40%). Students' use of emerging technologies such as SNS increased significantly, but the gap between younger and older students was shrinking. While about 95% of young students aged 18 and 19 had used SNS consistently for the last four years, use by those aged 25 and above increased steadily over the same period. Usage of IM and SNS tended to be daily whereas Voice over Internet Protocol (VoIP) was used by 4 out of 10 with a monthly median.

In addition to students' use of technology for employment, social and entertainment purposes, the survey also asked respondents about the use of technology as part of their courses. The results showed that the majority of respondents frequently used their university library website, presentation software, course website or the university's learning management system. For newer web-based technologies, however, the students' uptake was still low. In 2010 the report for the first time asked about the use of e-books and found about 25% were using them but only 4% owned a dedicated reader.

ECAR began asking questions about students' view on the use of IT in courses in 2007 and the responses to these questions have been consistent from year. High levels of use of technology did not necessarily translate into preferences for IT use in the classroom. The report authors were surprised that the desire for moderate IT in courses had been highly consistent over the years despite the fact that students' use of technology in personal lives had increased. Nevertheless, they also speculate that it would be possible that what was considered as 'moderate' use of IT in 2004 might be considerably different from what respondents in 2010 have in mind.

Ramney (2008) investigated undergraduate students at Texas Tech University in an attempt to provide insight into students' perceptions of the seven characteristics assigned

to the millennial generation by Howe and Strauss (Howe and Strauss 2003). The characteristics surveyed were: 'special, sheltered, confident, team-oriented, conventional, pressured, and achieving' (p.6). The results from the survey showed that students' agreement with the seven characteristics was relatively high for all of the characteristics except for team-oriented and sheltered. Variations in perceptions in characteristics noted in different groups included gender, ethnicity, socioeconomic status, family history of education, and geographical area of primary and secondary education. There were also significant differences between self- and peer-perceptions for all the seven characteristics except for sheltered. In general, the study supported the seven characteristics assigned to the Millennial generation students.

Nevertheless, there was little evidence that students desired more technologically-driven approaches to teaching and learning (McWilliam 2002). In fact, empirical evidence showed that students' high levels of use and skill did not necessarily translate into preferences for an increased use of technology in the classroom. Students held conventional attitudes towards teaching and learning (Garcia & Qin, 2007; Lohnes & Kinzer, 2007) and preferred moderate amounts of technology in the classroom (Salaway & Caruso, 2007).

Vaidhyathan (2008) criticized the claims about the digital generational shift and argued that the assertion of a 'digital generation' is over-generalizing. Instead, the technological skills of college students varied, even at elite universities, and there were a number of socio-economic factors that were independent of generational demographics. Talking about youth as Digital Natives ignored the different ways that young people use technologies. Similar findings were obtained from Hargittai & Walejko (2008) who found that students' habits of creating and sharing digital content correlated with their identity traits.

In recent studies, Hargittai (2010a, 2010b) showed the complexity and variation in people's use of Internet and argued for a more nuanced approach to research in this area. She explored more than a thousand American first year university students' on their Internet uses, skills and participation as well as demographic characteristics. The results showed that there was considerable variation in students' online skills, and that these were largely related to students' socioeconomic backgrounds. Students from lower socioeconomic backgrounds (women, African Americans and Hispanic students) were less confident and took part in fewer activities than those from more privileged backgrounds (men, White, and Asian American students). The findings suggested that, even among a group of highly wired young people, there was considerable variation in how they embraced the Internet in their lives. This raised the question whether only a segment of the population was taking advantage of the Internet and whether this was decreasing or potentially increasing social inequality. Hargittai's work shows clearly that issues surrounding the idea may have changed but that the issue of a digital divide remains significant in the U.S. context.

Hargittai *et al.* (2010) investigated how first year students at a U.S. university looked for and evaluated online content. They found that students displayed a high level of trust in search engine brand as a measure of credibility. Only 10% of the students commented on the site author or that author's credentials. The authors commented that this suggested that students had such a level of faith in their chosen search engine that they did not feel the need to verify the content independently. This research suggested that students also had a strong reliance on brands such as Google or Microsoft and a discrimination based on domains with higher credibility being given to educational and governmental domains (i.e. .edu or .gov). Their article ends by suggesting that initiatives are required to educate people in how to evaluate the credibility of online content and a contrast is drawn with the

Net Generation and Digital Native literature that suggests young people come naturally equipped with these skills naturally.

Previous research Kvavik (2005) found that students' academic usage of technology was strongly related to their academic disciplines and years, with students from business, engineering, and life science disciplines reported higher skill levels and seniors spending more time on a computer than do freshmen. Nevertheless, communications and entertainment are very much related to gender and age. While men, especially young men spend more time on computer games, women spend more time on communication and shopping.

Similar conclusions on the influence of year and discipline on technology use were reported in a follow-up study that included over 18000 university students in U.S. universities (Kvavik & Caruso, 2005). It was clear from their research that ICT permeates all aspects of students' lives. There were also year and discipline differences reported in terms of hours of IT use, skill levels and preferences for technology usage. In general, seniors tend to prefer more technology in their courses than freshmen; and engineering, business and life-science students prefer more technology in their courses than students from other disciplines (Kvavik & Caruso, 2005).



## 2.4.2 Australia

In light of Prensky's (2001a, 2001b) notion of 'Digital Natives', Kennedy *et al.* (2006; 2008) studied 2000 first year students at the University of Melbourne in 2006. Running counter to many of the Digital Natives claims, the survey results showed that though many first year students are highly tech-savvy, their patterns of use of technologies varied considerably when they moved beyond basic and established technologies (e.g. computers, mobiles and email). Kennedy *et al.* argued that there was no universal student experience with regard to the use of technology among incoming first year students. There was a diverse range in students' access to, use of, skill levels with, and preferences for a range of technology based tools. Factors contributing to this variance included gender, background and discipline area.

In a recent study, Kennedy *et al.* (2010) again provided empirical evidence that contradicted the claims made about Digital Natives being a homogeneous and highly skilled group of young people with respect to ICT. They found that there was a widespread diversity in students' access to, skill levels and use of technologies. Statistical analysis identified four distinct types of technology users within the Net Generation age group: power (14%), ordinary (27%), irregular (14%) and basic (27%). Power users made use of a wide range of technologies whilst ordinary users used mainly web and mobile technologies. Irregular users were similar to ordinary users but their frequency of using web and mobile technologies were lower and were less likely to use emerging technologies except for web 2.0 publishing. Basic users were irregular users of new and emerging technologies but regular users of standard mobile phones. The diversity of the student cohort suggested that a 'one size fits all' approach would be inappropriate when integrating ICT into university curricula. Kennedy *et al.* went on to suggest that pedagogical and curricular changes that

were proposed to accommodate the needs of the new generation of learners should be both evidence-based and empirically informed, rather than making predictions based on a generation assumption that students coming to university have had a universal digital upbringing.

Adding to Kennedy *et al.* (2010), Corrin *et al.* (2010) conducted a survey on a group of first-year university students' technology access and practices both in everyday life and for academic study. The results showed that not all participants fitted neatly into the stereotype of the 'Digital Natives' in terms of access and usage of technologies. They were not a homogeneous group in relation to access, skills and experience with technology. While access to and use of certain technologies was quite high, access to and use of others remained markedly low. Furthermore, there was also a mismatch between students' use of technologies in their everyday lives and for their academic studies. Implementing technology as part of academic study was generally lower than their everyday technology usage.

Judd & Kennedy (2010) reported on a large-scale study of Australian biomedical students' on-campus use of the Internet over a five-year period. While most of the research evidence to date consisted of self-reported snapshots of technology use, Judd & Kennedy (2010) monitored students' actual technology use and variation in use over time. The most frequently used technologies included the university's learning management system, Google, email and Facebook. The results showed that students were heavy users of Google and Facebook, with the use of both tools increased over the study period. Email was the most popular though its use declined substantially between 2005 and 2009, with the introduction of social networking sites. (Facebook first entered the market in 2005. There was then a rapid uptake of Facebook between 2006 and 2007.) With the exception of

Facebook, use of 'web 2.0' technologies (e.g. blogs, Twitter, social bookmarking, and photo-sharing) remained low.

Using part of the Australian biomedical study data, Judd and Kennedy (2011) reported on a group of undergraduate students' computer-based task switching and multitasking behaviour. Based on detailed analysis of over 6000 individual sessions, they concluded that, while a majority of students engaged in task switching and multitasking, their intensity was less frequent than prominent net-generation advocates would lead us to believe. Students' incidence and intensity of task switching and multitasking varied significantly, although low-level users greatly outnumbered inveterate users. While male and international students were more likely to task switch and multitask than their female and local counterparts, multitasking in students who entered university directly from secondary school was more common than in graduate students.

Krause *et al.* (2005) reported findings from a decade of Australian national studies on the attitudes and experiences of first-year university students. The results suggested that ICT played a significant role in changing teaching and learning. First-year students' satisfaction level with access to computers increased considerably from 1999 to 2004. In 2004, a majority of students used web-based course resources. Over 70% of the student population used web-based course resources daily or weekly and only 3% never used the web for study purpose before. A large number of students surveyed used emails to keep in touch with peers and lecturers, though only one-fifth did so regularly. Though only a minority of first-year students were involved in online discussion groups, the proportion increased somewhat over time. In 2004, 90% of students had adequate access to computers both at home and at university.

Furthermore, Krause (2007) found that students' skill sets with technology varied according to their socio-economic background, age and gender. Students from rural areas had consistently low levels of web use for communication, entertainment and study purposes. Male and younger students generally used the web more for entertainment purposes than female and older students. Confirming Kennedy *et al.*'s (2006) earlier findings, Krause pointed out that it was misleading and dangerous to assume that the use of digital technology was a universal experience among these young people.

In the same year, Oliver and Goerke (2007) surveyed first-year engineering and business students and found that there was a rapid growth in students' ownership of laptops, mobile phones and music devices and use of web resources for learning for the past few years. Many of the students were frequent users of emergent tools, such as instant messaging, blogs and podcasts. However, they were mainly used for social and entertainment purposes: the majority rarely or never used these technologies for study purposes. Furthermore, they also noted that there was a gap between the digital habits of undergraduate students and their teachers' use of emerging technologies.

Waycott *et al.* (2009) reported qualitative research that ran counter to assumptions made about the 'digital divide' between the more technological adept 'digital native' students and their less savvy 'digital immigrant' teachers. 46 first year students and 31 teaching staff were interviewed on their perceptions and use of technologies both in their daily lives and in teaching and learning. The results showed that students and teachers used many of the same technologies in their everyday lives. There was a significant overlap in their use of technologies for personal and entertainment purposes. As Waycott *et al.* (2009) put it, the 'differences in the way students and staff perceive and use technologies in higher education might be better understood in terms of their different roles as students or staff, rather than age-related differences' (p.17).

### 2.4.3 United Kingdom

Despite the general claims about the Net Generation and their advanced level of skills with technology, empirical studies showed that students' level of confidence with technologies varied significantly. The variation by age was not a simple division between the Net Generation and non-Net Generation age group. There was also significant variation among the Net Generation students (Jones & Healing, 2010a).

Based on nine months' work, Demos published a report (Green & Hannon, 2007) on how children and young people in the United Kingdom use new technologies. Contrary to some popular claims that the use of digital technology has been completely integrated into today's young people's daily lives, Green & Hannon (2007) discovered a gap between the small group of digital pioneers who frequently engaged in digital creative production and the majority of others who rarely fit into this category. According to their different preference of use, Green & Hannon identified four types of users: digital pioneers, creative producers, everyday communicators, and information gatherers. All the young people were using technology in different ways. Furthermore, they had their own hierarchy of preference for using digital technologies for learning despite their parents and teachers' assumptions.

Building on the Demos report published one year earlier that focused on school students aged 16-18 prior to their transition to university, in 2008 the Joint Information Systems Committee (JISC/Ipsos MORI 2008) issued a report on first year students aged 17-19 in UK higher education institutions. The report accepted that argument that "Students are 'Digital Natives' - having grown up with ICT and expect to use their own equipment at university" (p.7). The authors argued that the most common use of technology at university

was to support students' social life, such as communication with friends and family, checking out administration, clubs and society activities etc (JISC/Ipsos MORI, 2008). Students still saw face-to-face interaction as the best form of teaching although the use of ICT for teaching was perceived as a beneficial experience. The Demos report and the JISC/Ipsos MORI report both endorsed large parts of the rhetoric concerning a new generation underpinned by empirical work in a UK context.

JISC also supported a series of studies looking at the student experience following a literature review by Sharpe *et al.* (2005) which concluded that research had given far more attention to the practitioner perspective and to course design, but little attention had been given to the student voice. The review led to the commissioning of two projects, LEX Learner Experiences of e-Learning (Creanor *et al.* 2006) and LXP Students' experiences of technologies (Conole *et al.* 2006). One emerging theme from the LXP study is that students see technology as 'integral to all aspects of their lives'. Learners are evidently comfortable with using technology and appropriating technologies to meet their own personal needs. They claimed there is 'a profound shift in the way in which students are working' that suggests 'a complex inter-relationship between the individuals and the tools' (Conole *et al.* 2006, p.96).

Selwyn (2008) surveyed 1222 undergraduate students in an attempt to understand their academic use of the Internet. Analysis of the data also suggested that students' academic Internet use was strongly related to gender and discipline rather than differences in technology access or expertise. Students from medicine, social studies, law and business reported higher levels of educational Internet use than students in creative arts, architecture/planning and the humanities. In regard to gender difference, female students tended to be significantly more likely to seek academic information online than their male counterparts. Selwyn also found that students' use of the Internet and found that academic-

related information searching was a prominent but not predominant aspect of students' daily engagement with the Internet (Selwyn, 2008). Selwyn (2009) conducted an in-depth qualitative analysis of 909 UK undergraduate students' Facebook posting activities and concluded that students' use of social networking sites such as Facebook had become important for students' social and culture learning of 'being' a student rather than necessarily enhancing their formal studies.

Margaryan and Littlejohn's (2008) studied undergraduate students' use of digital technologies in two UK universities and found no supporting evidence regarding the claims made by previous studies that students were adopting radically different learning patterns. Far from demanding that lecturers change their practice, students appeared to 'conform to fairly traditional pedagogies' (p. 1) and make minor use of technology tools for learning. The same study has recently been further elaborated in Margaryan *et al.* (2011). Far from demanding that lecturers change their practice, students appeared to conform to fairly traditional pedagogies and make minor use of technology tools for learning. Use of collaborate knowledge creation tools, virtual worlds, and social networking sites was low. 'Digital native' students (born after 1980) and students from a technical discipline (engineering) use more technology tools compared with 'digital immigrant' (born before 1980) and students from a non-technical discipline (social work). Students appear to conform to traditional pedagogies and their learning styles appear to be influenced by lectures' teaching approaches. They found that students possessed limited understanding of what tools they could adopt and how to support their learning. With regard to formal learning, the virtual learning environment (VLE) was used as the main support platform in both universities. The most popular tools for formal learning included general websites, Google, course websites and to a lesser extent, text messaging. Tools used for informal learning reflect these results, with the addition of mobile phones. There

were, however a large number of students who never used virtual chat, MP3 players, handheld computers, podcasts, simulation games, Myspace, Youtube or blogs for learning.

Students made very limited use of more advanced technologies such as the media sharing, social networking, collaborative knowledge creation tools, and personal web publishing. Contrary to the image of Net Generation learners, they found that ‘many young students are far from being the epitomic global, connected, socially-networked technologically-fluent digital native who has little patience for passive and linear forms of learning’ (p.22). Margaryan *et al.* (2011) went on argued that decisions surrounding the use of technologies for teaching and learning should be based on understanding of the educational values of specific technologies and how they could improve both the process and outcomes of learning.

The Net Generation encountering e-learning at university remains the largest UK based project in this area (<http://www.open.ac.uk/researchprojects/netgeneration/> ). A research council (ESRC) funded project, that ran from January 2008 until March 2010, the research was conducted with students over 14 courses from five ‘main type’ English universities, in an aim to investigate students’ use of technologies in their first year of studies. Jones *et al.* (2010) reported key finding from the first phase of the project. Again, the results of the survey did not fully correspond with the Net Generation or Digital Native assumptions. They concluded that students were not homogeneous in their use of new technologies and there are variations among students within the Net Generation age band. Despite the considerable amount of time students spent on the Internet computers and the Internet, they made limited use of blogs, wikis and virtual worlds (Jones and Cross, 2009). In general, students were active users of new technology. However, there were also some minorities



who made very little use of them. There exist a significant minority though very much who either did not use email or have no access to mobile phones (Jones & Cross, 2009).

Jones and Hosein (2010) using data gathered in the second year of the project, examined students' use of technology and categorized students into clusters based on whether they were using web 2.0 tools (web interactive), audio and video editing tools (technical-oriented), social networking tools (social interactive), gaming consoles (game-oriented) and online resources or word processing/presentation software tools (work-oriented). It again added to the argument that there was not a single Net Generation with common characteristics. Age only seemed to be an important factor, rather than the sole factor, in students' use of web 2.0 and social networking sites and was dependent of other demographic and social factors (Jones & Hosein, 2010). Gender, national origin (local or international students) and mode of study (traditional place based or distance learning) all had a significant impact on students' use of technologies at the beginning of the academic year and continued to be influential factors along with gender towards the end of the academic year (Hosein *et al.* 2010).

As part of the second phase of The Net Generation Encountering eLearning at University project, Ramanau *et al.* (2010) investigated whether the Net Generation (aged 25 and below) students' time spent for both social and study purposes than older students. Survey results showed that while Net Generation students spent more time on ICT for social and leisure purposes than the non-Net Generation students; the non-Net Generation students spent more time with ICT on study than the Net Generation students. While young people tend to use ICT more for social and entertainment purposes, older students tend to use more ICT for study purposes.

The survey research conducted by this group concluded that digital and networked technologies infused most English students' lives and the material context claimed for a Net Generation existed in the United Kingdom with a widespread availability and access to computing devices of all kinds and good network connections. They found age related differences but no single identifiable generational set of changes. Age was often combined with other significant factors including, institutional mode (distance or place-based) and gender. Social Networking and communication technologies were found to be at the centre of those differences that had an age component and with regard to these there was evidence that the Net Generation age group was itself divided internally by age. It was striking that students were often physically alone but usually digitally connected using SNS e.g. Facebook, voice over Internet e.g. Skype and Mobile phones. Often communication technologies using digital networks were used to help maintain distant links rather than increase the density of local contact (eg. Home from university/university friends from home).

Jones and Healing (2010a) also discussed students' local habitations in place-based traditional universities in relation to Crooks earlier findings (Crook, 2002). Their findings suggested that although the technological landscape in the past 10 years had changed dramatically, students' practices didn't seem to have moved as quickly. Students tend to use the same technologies they used for social and leisure purposes as they did for study purposes, though they were introduced to new technologies when entering university. Despite the increased mobility made available by new devices and increased accessibility to Internet, students still largely studied in study bedrooms, dedicated work spaces in their permanent residence or university libraries, with little work being undertaken using mobile technologies, in addition to smartphones e.g. laptop or netbook computers. However, one way there has been considerable change is the way technology has become much more integrated in mediating 'face-to-face' encounters in students social and leisure activities.

Jones and Healing (2010b) examined a case made for Net Generation learners in terms of agency and choice, in an aim to understand what kind of choices students were making in terms of which technologies to engage with during their studies. Their results showed that students' choices were not direct responses to technologies that were universally available, rather they were responses to local university infrastructure and specific requirements set out for the course.

Though there was a growth of university students' ownership of laptops, mobile phones and music devices and use of a range of online tools, the technologies were mainly used for social purposes, not for learning. Confirming Oliver and Goerke's (2007) findings from Australia, who found that students mainly used the emergent technological tools for social and entertainment purposes rather than for study purposes, recent research from the United Kingdom (Jones *et al.* 2010; Jones & Ramanau, 2009) showed that there was a significant difference in students' use of technology for social and leisure purposes and for academic use.

McKnight (McKnight, 2010) studied students at Nottingham Trent University and argued that the Digital Natives may feel comfortable in a digital immersed environment at home, but they were often lack of information literacy skills or understanding of issues like plagiarism and copyright. She called for a radical rethink of the role of future librarians and proposed that modern librarians must be able to adapt their professional skill sets to suit the needs of a multitude of new learners.

#### **2.4.4 Canada**

While assuming young people are technologically proficient, age might not be the only factor to consider. Some (e.g. Bullen *et al.* 2008; Bullen, Morgan, Belfer and Qayyum; 2009) argued that students' communication preferences were not simply age or generation related. Tech-savviness was more about exposure to technology than being affiliated with particular generation (Oblinger and Oblinger, 2005; Oblinger, 2008).

In Canada, Bullen *et al.* (2008) studied students' social and educational use of technology and the extent to which they could be characterized as 'Millennials'. The results from the interviews showed that students' use of technologies were not generation related. Despite the vast availability of tools freely available on the Internet and provided by institutions, students only use a very limited range of tools. Within the limited range, the selection of tools was driven by three characteristics: their familiarity with the tools, cost and immediacy the tools can provide. From interviews with the students, Bullen *et al.* (2008) also found that students do have a good understand of what technology can and can not do for them in specific context. Data also showed that there was a considerable variation in students' technology perceptions of whether their needs have been met across disciplines: students in an Automotive programme felt their needs were being met very well, whereas students in the Architecture program reported a lack of essential tools.

In a follow up study, Bullen, Morgan, Qayyum, Belfer and Fuller (2009) confirmed their previous finding that, rather than age or gender, students' use of technologies for learning purposes was largely influenced by their disciplines. Based on 69 interviews with students, Bullen, Morgan, Qayyum, Belfer and Fuller (2009) developed a survey consisting of psychological and behavioural items to determine the extent to which students fit the typical Net Generation profile. 849 students from 14 courses completed the survey and results showed there were no generational divide in the British Columbia Institute of Technology (BCIT) student body studied. Although some of the descriptors of Net

Generation learners were evident in BCIT learners, generation did not help explain the difference in students' learning approaches or the use of technology. Furthermore, there was 'little evidence to support a claim that digital literacy, connectedness, a need for immediacy, and a preference for experiential learner were characteristics of a particular generation of learners' (p. 10).

Bullen, Morgan, Belfer and Qayyum (2009) challenged the grand claims made about the Millennial or Net Generation learners and their difference to the previous generations, and concluded that there was no meaningful difference between the Net Generation and non-Net Generations' use of technology, behavioural characteristics or learning preferences. While the use of some technologies were ubiquitous (e.g. mobile phones, email, and MSN), there were 'little evidence to support a claim that digital literacy, connectedness, a need for immediacy, and a preference for experiential learner were characteristics of a particular generation of learners' (p. 10).

Similarly, Salajan *et al.* (2010) discussed the digital native-immigrant dichotomy through a small scale study conducted with students and faculty members at University of Toronto, on their attitudes towards the implementation of digital technologies into the curriculum. Survey results showed that a definitive distinction can not be drawn between the digital native students and digital immigrant faculty members surveyed. They argued that the digital native-immigrant dichotomy was a complex phenomenon and could not be described in extreme terms. These confirmed conclusions from Australia (Bennett *et al.* 2008) who asserted that the Net Generation claims 'have been subjected to little critical scrutiny, are under-theorized, and lack a sound empirical basis' (p. 776).

Gabriel and MacDonald (2009) in Canada studied the expectations of new learners entering the first year at a small Canadian university regarding the use of digital

technologies for learning. Confirming findings from the United States ( Jones, 2002; Kvavik ,2005; Kvavik & Caruso, 2005) and United Kingdom (Margaryan and Littlejohn, 2008; JISC/Ipsos MORI, 2008) data from web survey and interviews show that while technologically savvy, Net Generation learners still anticipated using technology in fairly traditional ways.

A joint project by the Working Group on Library Instruction of the Subcommittee on Libraries of the Conference of Rectors and Principals of Quebec Universities (CREPUQ) was conducted to study the information literacy skills of undergraduate students entering Quebec universities (Mittermeyer and Quirion, 2003). A questionnaire including five themes was compiled based on standards published by the Association of College and Research Libraries, in an effort to study students' 'concept identification', 'search strategy', 'document types', 'search tools', and 'use of results'. 3003 questionnaires were returned and analyzed. The results showed that the Internet was widely used as a source of information; however a significant number of students had limited knowledge of the information research process. The poor information research skills has resulted in few or no relevant documents being found, time wasted due to inefficient search strategies, and too many or too few documents being found. Mittermyer and Quirion (2003) also argued that there was a need to promote awareness at the institutional level that students should develop the ability to recognize when and how to locate, evaluate the use the information needed and promote the integration of information literacy instruction in higher education institutions.

#### **2.4.5 Other European countries**

Lusoli and Miltgen (2009) reported on surveys of young people aged between 15 and 25 in four EU countries- France, Germany, Spain and United Kingdom showed that there were significant differences between countries in terms of digital culture. For instance, 'Spain presents lower social network usage; France has a blogging culture; and youngsters are more skilled in Germany than elsewhere' (p. 9).

Furthermore, the evidence showed that there were various factors that may influence students' perceptions and skill levels with technologies, such as gender, socio-economic background, year and disciplinary differences. Several studies served to illustrate this point including an Italian study that illustrated the lack of homogeneity amongst students (Ferri, *et al.* 2008). This study concluded that the evidence supported at least three different higher education student profiles. The profiles were derived from an analysis which combined two factors, firstly the intensity of Internet use and secondly content production, which was defined as uploading content to sites like My Space, Wikipedia, YouTube and general activity in social networks. The three profiles were characterized as:

- The digital mass - accounting for almost half of the students - heavy Internet users but not so keen on producing digital content.
- The neo-analogical - approximately 20% of the students, produce some content but connect to the Internet less than the average student.
- The inter-activated – approximately 30% of the students, close to the prevalent image of new millennium learners - heavy Internet users and quite frequent content producers.

## Germany

In Germany, the Institute for Media and Educational Technology at the University of Augsburg initiated the I-literacy project in 2007 in an aim to develop an infrastructure to support teaching information literacy skills to incoming students at universities as a main component of academic working skills (Heinze, 2008). Heinze reported that students' over evaluated their information literacy, while only just about half the respondents could answer questions about Internet searching correctly. The pervasive use of technologies did not necessarily transfer to the ability to use computer for learning (Schulmeister, 2008). The results from the study showed that students were 'net savvy but not information literate' (Keinze, 2008; p.1). Although the Net Generation learners knew how to use technology for their personal use, they were not necessarily capable of using it for learning and work purposes in their future life (Lorenzo, Oblinger and Dzubian 2006). In order to achieve competency in the effective use of technologies for learning, students needed special skills which they had apparently not acquired through using digital technologies for leisure (Heinze, 2008).

Schulmeister (2010) surveyed more than 2000 students in Germany via the Internet to investigate if students today are interested in the use of web 2.0 technologies for learning. The results showed that students had a very pragmatic and instrumental way of using technologies. The study presented what Schulmeister described as a rather disappointing overview which contrasted with the 'myth' of the Net Generation. Schulmeister argued that students have a very realistic attitude to time management and a pragmatic way of using services when they need them. Only those applications which were especially helpful in communication and information searches were frequently used. He noted that gender differences and digital divides still exists and concluded that it had become apparent that:



‘education is not the primary purpose of media use and that there is no transfer from extensive computer experience to learning’ (p.22).

## Norway

In Norway, Rønning and Grepperud (2006) reported on a comprehensive national survey on adult flexible students’ daily usage of ICT. Based on survey data from 1477 students, with an average age of 39 years, it was suggested that access to PCs and the Internet was generally high in Norway; however there were some variations according to their employment status. Younger, unskilled, part-time employees had the least access to the Internet at work. The authors argued that good access provided a better basis for the increasing use of ICT; however, there was no correlation between access to technology and an increase in usage. They also found that the Internet and email played a less significant role than expected as communication tools among students and between students and teachers outside formal teaching sessions. As Rønning and Grepperud (2006, p. 9) put it, ‘Digital communication has by no means replaced other media such as the telephone or physical meetings’.

## Denmark

Ryberg *et al.* (2010) argued that the notion of ‘Digital Natives’ should be examined critically; instead, young people need to develop such skills. By presenting a case of a web 2.0 learning environment, Ryberg *et al.* (2010) argued that there was a gap between educators’ intentions and students’ actual outcomes. There was a need for stronger pedagogical and institutional efforts in implementing social software into the curriculum. The Net Generation might need support and guidance to develop their technical skills for

use in academic contexts. While many students might have extensive experience using social software as part of their everyday life, they may need support in translating these experiences into academically informed practices, including judging the validity of sources, pooling knowledge, and searching, synthesizing, and disseminating information as a collective.

## **Spain**

The Digital Learners in Higher Education project is an international project aiming to develop further understanding of how postsecondary students in different institutional and culture contexts perceive and use technologies in their social and educational lives: it involves a Canadian polytechnic teaching institution (BCIT), a Canadian research-intensive university (University of Regina) and a European online university (Open University of Catalonia). As part of the project, Romero *et al.* (2010) adapted a survey designed by their BCIT partners (Bullen *et al.* 2009) and administered it to students in Open University of Catalonia, Spain. Consistent with findings from BCIT, the data showed that there was very little difference between the Net Generation and non-Net Generation learners at the Open University of Catalonia in terms of their learning and communication preferences with ICT. Romero *et al.* (2010) concluded that the notion of a Net Generation as presented in the literature was more speculative than real.

### **2.4.6 South Africa**

Studies from South Africa (Brown & Czerniewicz, 2008; Brown & Czerniewicz, 2010; Czerniewicz *et al.* 2009) reported examples where respondents in the local context did not

match the way the broader literature might have led researchers to expect. Brown & Czerniewicz (2008) surveyed 3533 students regarding their ICT use in six higher education institutions in five South African provinces. Despite the growing emergence of new technologies, the findings suggested that the students' use of computers for teaching and learning was still quite narrow. There was no evidence that ICTs were ubiquitous in students' everyday lives, nor could they be described as being established in higher education courses. Even though there was a growth in the use of more familiar technologies such as web searching and instant messaging, there was 'a surprising low use of social software tools' (p. 2). The results also confirmed findings from other studies on ICT use for teaching and learning in South Africa higher education (Czerniewicz & Brown, 2005; Hodgkinson-Williams & Mostert 2006) which had noted that the most frequent web activities were information seeking and word processing.

The use of ICT remained mainstream though students from different disciplines reported different frequencies of use of more specialized e-learning activities. More students from science disciplines report above-average use whilst students with below-average use were predominantly from the humanities (Brown & Czerniewicz, 2008). This finding runs counter to their 2004 study where the sciences and humanities were the least frequent users of ICTs (Brown & Czerniewicz, 2007). Moreover, students' use of ICT was found to be related to the institutional approach to e-learning. Students reported more frequent use at institutions that incorporated e-learning approaches to teaching.

Drawing on a research project on South Africa university students' access to and use of ICT, Brown and Czerniewicz (2010) concluded that age was not a determining factor in students' digital lives; rather, their experience with ICT was more important. Instead of a new generation of young people entering higher education, there was deepening digital divide in South Africa characterized by access to ICT rather than age. They argued that the

notion of 'Digital Natives' was a problematic concept, both conceptually and empirically. As a concept, it was problematic as there was implied superiority attached to those with a particular set of skills and dispositions. Moreover, the idea that people are born into something that they cannot change is problematic. In addition, there was insufficient empirical evidence to support the Digital Natives concept.

Thinyane (2010) reported another study conducted with students at South African universities. Again, contradictory to Prensky's Digital Natives claim (2001a, 2001b, 2010), the results of the study portrayed a heterogeneous student population, with varied levels of access to most of the technologies. Furthermore, web 2.0 technologies, which were claimed to be a key feature of Digital Natives, did not appear to be actively used by students in their daily lives nor in their studies. Confirming previous South African studies (Czerniewicz & Brown, 2010; Brown & Czerniewicz, 2010; Brown & Czerniewicz, 2008), the survey results showed that mobile phones, outnumbering the other tools, were the most accessible (98.1%) among students. Tasks involving the use of mobile phones ranked the top in both students' daily activities with technologies and the use of technology specifically for their studies.

#### **2.4.7 Chile**

Sánchez *et al.* (2010) interviewed students and teachers from four cities in Chile to explore the current generation of students and their relationship to technology. This was a developing country, where access to ICTs was far from that in developed countries. Sánchez *et al.* (2010) took a qualitative perspective, in an aim to provide some empirical evidence to the discussion of 'Digital Natives' in Chile. The interview results showed that students' skills and abilities with technology did not represent a precise description of the

‘Digital Natives’ described in the literature. There was not a generation with common traits with regard to their use of ICTs; on the contrary, some students made highly sophisticated use of ICTs whereas others made little. There was no evidence to show that students’ skill levels with ICTs were distinct from those of previous generations, as Prensky (2001a, 2001b) had claimed. Though some students used several applications at the same time when using computers, there was no evidence to show that they were multi-taskers or had any special abilities to process information in parallel. Though students’ in general had wide access to ICTs and heavily integrated ICTs into their everyday lives, there was no evidence that students’ traditional social activities such as getting together with friends in and out of school, had been replaced by the use of ICTs. Face-to-face communication was still highly regarded among the students. Furthermore, it was found that the students’ experience with ICT in the Chilean context was not distributed according to socio-economic status as expected; instead, it was related to gender in some specific activities such as video games.

#### 2.4.8 Hong Kong, China

Another major argument of the Digital Native/Digital Immigrant discourse was around the ‘digital divide’ between today’s young students and their instructors. The argument that there was a need to change current educational practices was based on the idea that there was a profound gap between Digital Native students’ and their Digital Immigrant instructors in terms of their technological literacy (Prensky, 2001a).

In research related to Australian studies (Kennedy *et al*, 2006; 2008), McNaught *et al*. (2009) investigated 689 first-year students in Hong Kong and 56 of their teachers using the same survey instrument in an aim to explore the digital divide between teachers and students. The results showed that, although students were ‘digital ready’ in general, there was variation in both their level of ownership and their perceived skills levels with digital devices. The digital divide between students and teachers was not straightforward and ‘the so-called Digital Natives (students) were not always more digitally-oriented than the so-called immigrants (teachers)’ (p. 10). Both teachers and students were capable of using basic computer and web technologies. Rather, the digital divide between students and teachers appeared to relate to preferences and prior experiences with technologies. The digital divide was less apparent regarding access to technology. More students than teachers in general had access to digital technologies (desktop computer, mobile phones, MP3/4 player, video game console and broadband Internet) apart from two items: laptops and personal digital assistants (PDAs).

Confirming previous findings from the United States (Kvavik, 2005; Kvavik & Caruso, 2005), Australia (Krause 2007; Kennedy, 2008), the United Kingdom (Selwyn, 2008; Jones & Cross, 2009), Canada (Bullen *et al*. 2008) and South Africa (Brown &

Czerniewicz, 2007; 2008), McNaught *et al.* (2009) also found that gender and discipline were related to the diversity of students' digital experience. For instance, men were found to be more capable of using advanced web or mobile features and games, while women are more capable of using technology for socializing and entertainment. Discipline-wise, students in Education, Law and Science disciplines in general had better access to technology and were able to use a wider range of technology-based strategies than students in other disciplines such as Medicine and Arts.

Based on a survey of 649 secondary school students in Hong Kong, Chu (2010) concluded that despite growing up in a digital age, young people in the study did not show marked different characteristics in their media use. 'Contrary to popular rhetoric, young people are far from active users or prosumers in the new media age' (chapter 8, line 13-14). Instead, they went online mainly for entertainment purposes, they were not familiar with information management tools, they blogged infrequently, and they rarely engaged in image/video sharing activities such as Youtube.

## **2.4.9 General empirically based review**

One of the founding assumptions of claims for a generation of Digital Natives was that they have grown up with computers and the Internet, and were naturally proficient with new digital technologies. Research into university students' perceptions and use of technology, however, offered a more diverse view of the role of technology in young people's lives. As Pedró (2009) put it, 'a far more complex picture than it is often presented in most of the well-known essays about this topic' (p. 4), not all students fit equally well into the new millennium learners image.

Rather than claiming this generation possess unprecedented levels of skill with information technology (Tapscott, 1998), there was a diverse range in students' access to, use of, skills with, and preferences for a range of technology-based tools. Recent empirical studies from Australia (Kennedy et al. 2008; Krause, 2007), the United States (Kvavik et al. 2008), the United Kingdom (Margaryan and Littlejohn, 2008; Jones & Cross, 2009; Jones et al. 2010), Canada (Bullen et al. 2008) showed that students' experiences and understanding of technology was far from a universal experience.

Pedro (2009) carried out a meta-analysis of studies from countries in the Organisation for Economic Co-operation and Development; current members include: Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States, Japan, Finland, Australia, New Zealand, Mexico, Czech Republic, South Korea, Hungary, Poland, Slovakia). He concluded that not all students fit equally well into the new millennium learner image. There were differences in students' technology adoption and use, the digital divides clearly exist. Furthermore, there was not enough empirical evidence to support the claim that students' use of digital media has transformed the way in which they learn or their preferences and perceptions concerning teaching and learning in higher education. Either is there empirical evidence of the effects of technology on cognitive development.

#### **2.4.10 Theoretical approaches**

Despite the ongoing discussion about digital natives, empirical evidence from around the world has portrayed a more complex picture of young people's use of technologies than the digital native commentators would suggest. As Bennett et al. (2008) proposed, rather



than being empirically and theoretically informed, the debate of ‘digital native’ could be likened to an academic form of ‘moral panic’. There was no empirical evidence for the grand claim made for any generational change and supposed urgent necessity for educational reform in response. Research into today’s learners and their use of technology for teaching and learning needs to be theoretically as well as empirically informed.

Several authors (Buckingham, 2006; 2009; Bayne and Ross, 2007; Bennet et al., 2008) have pointed out the impact of marketing and commercial interests in popularizing the idea of digital natives and the anecdotal generational gap between them and their teachers and parents. For instance, Buckingham (2009) argued the ‘digital native/immigrant’ concept was problematic, as it overstated the differences between generations while oversimplified the diversity within the generation (age differences within generations, forms of social inequality).

Similarly, White and Cornu (2011) concluded in their study that the concept of ‘digital natives/immigrants’ was not helpful in facilitating teaching and learning, as it suggests a deficit model of professional development in which ‘digital immigrant’ staff can never bridge the gap with ‘natives’ arising from generational position, no matter how hard they try. Instead, they proposed a ‘digital visitors and residents’ metaphor, in an aim to increase understanding of how learners engage with the web. Rather than drawing a clear distinction between generations, digital visitors and residents were defined by their approaches to tools. While digital residents view the Internet as a place to live in, digital visitors view Internet as a place full of collections of tools. In this account, students could be moved from a visitor’s position to a resident’s even if it might be a difficult process.

Palfrey and Gasser (2012) in a recent article restated their position and acknowledged that ‘digital native’ was an awkward term. Among other problems, it was problematic to imply

that digital skills are innate rather than taught and learned. However, they argued, despite its defects, the awkward term resonates deeply with parents and educators and served an important rhetorical purpose. Their decision was to embrace this term, albeit with caution and discretion, to describe a subset of young people and their interaction with digital technologies. Nevertheless, they have not yet provided a complete solution to use the term in a constructive manner without resorting to reductionism and without implying technological determinism.

Alternatively, Czerniewicz et al. (2009) provided accounts in understanding students' use of new technology as active agents in the process of technology engagement. They rejected social as well as technological determinism but focused on the active mediation between structure and agency. Building on this, Jones and Healing (2010b) suggested expanding the notion of agent to enact roles of collective organization such as course, department or universities. Their study showed that choices are not restricted to the individual. University and department decisions of what infrastructure to provide also had an impact on the range of choices students made. Jones went on to argue that the future of university provision is a choice but not the result of a technologically determined process (Jones, 2012).

Building on work by Wellman (2001), Castells (2001) used the term 'networked individualism' to describe the social form enabled by networked digital technologies, which allows people to connect with each other through geographically dispersed social networks. It suggests a move away from place-to-place interaction towards person-to-person interaction. Bennett and Maton (2010) suggested networked individualism placed the focus on the person rather than notions of collaboration and community. It has also been argued that networks rely as much on weak ties as they do on strong ties of traditional groups and communities (Jones, 2008; 2012).

Rather than viewing technology's inherent impact on young users in ways regardless of circumstances or context, it was perhaps more helpful to investigate young people's use of technologies as being subjected to a series of complex interactions with the social, cultural, economic, and political contexts into which they emerge (Selwyn, 2008). While Prensky's digital native claim is tied up with technological determinism, where generational change is caused by technological change, social studies of technology (SST) criticized this approach and argued that social and technological context of development shapes innovation choice. Rather than the technological determinism who believed that technology follows its own development path in regardless of human influence, SST proposed that the relationship between technology and society is mutually shaped.

#### **2.4.11 Summary**

The findings from the empirical research investigating the Digital Natives students' use of technologies in higher education have shown that, while there is a basis for these arguments (for instance, the use of computers and the Internet is present in most advanced and emerging industrial economies), the technological context does not translate in any simple way to a generational change in skill levels and attitudes to the technology. Rather than claiming there is a generation of Digital Natives who are naturally proficient with technology due to their exposure to a technology-rich environment, the empirical evidence from across different countries shows that students' experience with technologies is far from a universal experience. Not all students are equally competent with technologies, and their patterns of use vary considerably when moved beyond basic and established technologies (Jones *et al.* 2010; Kennedy *et al.* 2008; Kvavik *et al.* 2008). There are variations among students within the Net Generation age band (Bullen *et al.* 2008; Jones *et al.*, 2010). Students' selection of tools is related to other characteristics, including age,

gender, socio-economic background, academic major and year (Brown & Czerniewicz, 2007; 2008; Krause, 2007; Kvavik, 2005; Kvavik & Caruso, 2005; McNaught *et al.* 2009; Selwyn, 2008).

Although there has been a considerable growth in university students' access to a range of computing technologies and online technological tools, their use of these technologies is mainly for social and entertainment purposes, not for learning (Oliver & Goerke, 2007; Selwyn, 2009). There is a difference in students' use of technology for social and leisure purposes and for academic use (Jones *et al.* 2008; Jones & Ramanau, 2009; Ramanau *et al.* 2010).

Furthermore, contrary to Prensky's (2001a, 2001b) claims about students' changing learning preferences due to technology exposure and his call for a radical change in educational practice, empirical studies have shown that students' high levels of use and skill do not necessarily translate into preferences for an increased use of technology in the classroom. A large number of students still hold conventional attitudes towards teaching (Gabriel & MacDonald, 2009; Garcia & Qin, 2007; Lohnes & Kinzer, 2007; Margaryan & Littlejohn, 2008) and would prefer only a moderate use of technology in the classroom (Jones, 2002; Kvavik, 2005; Salaway & Caruso, 2007; Smith *et al.* 2010).

In all, much is now known about students and their use of technologies in western developed countries, such as the United States, Australia, UK, and Canada. However, little is known about Asian developing countries. China, as one of the world's fastest growing countries, is playing an increasingly important role in world economics and affairs in years ahead. According to the 23rd Statistical Report on China's Internet Development by the China Internet Network Information Center (CNNIC, 2009), by the end of 2008, the total number of Internet users in China had reached 298 million. Among these, young people

aged between ten and nineteen comprised the largest cohort. As this group of young people enters higher education, there is an urgent need for schools and institutions to understand how these young people use technologies in order to respond to the way they are learning both inside and outside the classroom. In light of the international Net Generation discussion, the next chapter discusses students' use of technologies in China and its implications for higher education.

# **Chapter 3 Literature Review on Students' Use of Technologies in China**

## ***3.1 Introduction***

Following the last chapter on the discussion about Net Generation university students in a variety of national and regional contexts, this chapter explores the Net Generation of young people in China and their use of technologies in higher education. The chapter begins with an introduction to the generational divide in China, followed by discussions about the Post-80s (also called China's 'Generation Y', Me Generation, Little Emperors) and their relationship with the Internet. Access to technology and the digital divide in China are presented in section 3.4. Section 3.5 reviews empirical studies of Chinese university students' experience with technologies. Finally, section 3.6 provides an overview of the modern Chinese education system.

## ***3.2 Generations in China***

The situation in China differed from that in the United Kingdom, the United States and other European countries. In China, 'Generation Y' is a fairly new term. There is not yet an agreed classification of generational cohorts in China. Instead of calling them 'Generation Y', researchers adopt social events or time periods to name this generation.

The most common classification was to name the generation cohorts in China after major social events (Li *et al.* 2006; Chen, 2008). For example, Li *et al.* (2006) named the generational cohorts in China after three major events: the Red Guards (born during the Cultural Revolution, 1966-1979); the Modern Realists (born during the Economic Reform,

1980-1991); and the Global Materialists (born during the globalization of China, 1992 to the present). Chen (2008), on the other hand, argued that according to the significant social events in Chinese modern history (the ‘Democratic Revolution’, 1927-1949 ; ‘World War II’, 1939-1945; the ‘Founding of the People’s Republic of China’, 1949; the ‘Great Leap Forward Movement’, 1958-1960; the ‘Cultural Revolution’, 1966-1976; and the ‘Economic Reforms’, 1977–), there are four distinct generational cohorts, namely the Red Generation (born before 1950), the Pre-Cultural Revolution Generation (1951-1964), the Post-Cultural Revolution Generation (1965-1973), and Generation X (1979-1984).

Others (Wang, F. 2009; Wang, L. 2009) would simply classify generations by the year in which people were born; some of the most common terms in circulation include the Post-70s, Post-80s, and Post-90s, standing for people born in the 1970s, 1980s and 1990s, respectively.

### ***3.3 The Post-80s in China***

Recently, discourse on the Post-80s (also referred to as ‘the Me Generation’, ‘China’s Generation Y’, ‘the Little Emperors’, ‘the Lost Generation’) has become increasingly popular in Chinese society (Elegant, 2007; Moore, 2005). With a population of approximately 204 million (born between 1980 and 1989), they were considered to be the future leaders and vital workforce in China’s social, cultural and economic development (Zhao & Liu, 2008).

The concept Post-80s was first proposed by Gong Xiaobing, a famous Chinese author in 2003 in a forum post entitled ‘Summary of the Post-80s’, originally referring to young authors born between 1980 and 1989 (China Online Literature Federation, 2004; Lin,

2009). This was the time when the Post-80s started to enter the workforce and show their huge impact on society, mainly through media, TV programmes, and their huge expenditure power. Popular Post-80s authors became best-sellers in bookstores. Famous youth authors, such as Han Han, Guo Jingming and Zhang Yueran became so popular that they attracted many fans, like pop stars. In 2004, Chunshu, a famous Post-80s female author, appeared on the cover of the Asian edition of *Time* magazine, which made her the first ever Chinese author appearing on this U.S. magazine's cover. Shortly after that, a number of Chinese Post-80s idols also began to enter the global stage. For example, Li Yuchun, winner of a famous Chinese TV singing competition, also appeared on the cover of the Asian edition of *Time* magazine in 2005 (People's Daily Online, 2009).

The concept of the Post-80s received massive media attention soon after it had been proposed. It rapidly grew to encompass anyone born in the 1980s and became widely used in other areas apart from literature (Chen, 2008; Gao & Meng, 2007; Lin, 2009). Since 2006, reports on the Post-80s expanded to fields other than literature: media coverage included reports on their working conditions, attitudes towards marriage etc. Wang, F. (2009) did a content analysis of 14 major Chinese newspapers from 2003 to 2008 and found that there were 681 articles referring to the Post-80s. Of all the reports, over 84.9% conveyed positive or neutral attitudes towards this generation of young people.

Despite the various claims about the Post-70s, Post-80s, Post-90s etc, Yu (2009) argued that the Post-80s was the only term which had become a valid social generation category. Divided by the year 1980, there was a generational gap between the 'Post-80s' and previous generations, 'striking a balance between altruism and egoism' (p. 46). In 1978, under the leadership of Deng Xiaoping China introduced its 'Opening-up' policy. Since then, China gradually opened its door to the outside world and started to play an increasingly important role on the global stage. Compared with their parents' generations



who grew up during the Cultural Revolution (1966–1976), the ‘Post-80s’ were born in a new era of modern China where they have benefited from China’s rapid social and economic development.

Compared with their parents, who often struggled to go to college, today around a quarter of Chinese in their 20s have attended college. When their parents talked about the Great Leap Forward (a disastrous campaign in the late 1950s that left 20–30 million people dead of starvation) and the Cultural Revolution, the Me Generation (children born after 1979, during the ‘one child policy’) could only vaguely imagine the scenes. Growing up at a time of tremendous economic growth and social development, the Me Generation showed less interest in politics (Elegant, 2007) and had much greater purchasing power than previous generations. In 1979, the Chinese government had implemented the ‘one child policy’ to limit China’s population growth. The policy limited couples to one child and continues a third of a century after its original implementation. Parents and family poured their all love into the development of this only child. Meanwhile the child was often subjected to constant pressure to fulfill parental ambitions that might otherwise be spread over siblings. In many households, the only goal for parents and grandparents was to get the child into a good university to ensure a prosperous future (Pleskacheuskaya, 2005). Being the only heir to family wealth, it has been suggested that single children in the Me Generation often consumed 50% or more of the family expenditure in some major cities (Zhao & Liu, 2008).

It was claimed that the special social and economic status in which China’s Generation Y had been brought up had cultivated their unique characteristics. According to Liu and Zhao (2008), two of the most distinct strengths of Generation Y in China are being well-educated and technologically sophisticated. They received better education than the previous generations. Due to the economic growth and higher-education expansion policy, around one in four Chinese in their 20s had attended college (Liu & Zhao, 2008).

Growing up with computers in their homes and at schools, technology became an integral part of life for Generation Y Chinese. It was claimed that they tended to be technology-oriented, adopting advanced technology and more likely to be Internet connected. Because of their familiarity with technology, they were also called the 'Digital Generation' (Meyer *et al.* 2008). According to a Gallup Poll survey in 2004 (Arora, 2005), Generation Y in China had far greater access and exposure to digital technologies (e.g. computers, Internet, mobile phones and MP3 players) than those aged 25 and above. While less than half (44%) of urban Chinese aged 25 and older had computer access, almost double that number of urban Generation Y (87%) had access to computers. They were also more likely to be familiar with the Internet than those aged 25 and above. One quarter of urban 18 to 24 year old young people never used the Internet, compared with only one-quarter of the 25 and above age group had been on the Internet. While online chatting and email were the primary online activities for Generation Y Chinese, those 25 and older were more likely to use Internet to check the news, to search for information and to seek references.

Meanwhile, Generation Y in China were criticized for lacking the ability to endure hardship, for being oriented towards individuality and for a lack of team spirit (Zhao & Liu, 2008; Liu & Zhao 2008). Having grown up in the golden times when China was keeping pace with globalization and achieving prosperous economic growth, there was a common perception among employers that many Generation Y Chinese did not have the strong will and vitality to conquer hardship (Moynihan, 2006; Wang, Y. 2006). Born during the 'one child policy' (Croll *et al.* 1985; Short & Zhai, 1998), this generation was more likely to receive excessive care from their family and parents (Doughty, 2009). The 'four-two-one' structure (which stands for four grandparents on both father's and mother's sides, and parents solely focusing on one child) made many 'little emperors' (Chandler, 2004) - the spoilt only son or daughter of the family. This 'little emperor syndrome' was especially

serious in urban areas of China, where the 'one child policy' was more strictly enforced than in rural areas (China Daily, 2003).

While Generation Y in Western countries were often regarded as team players from an early age (e.g. Oblinger and Oblinger, 2005), Chinese Generation Y professionals were criticized for lacking teamwork skills and experiences. According to a survey of 148 executives in China conducted by the Economist Intelligence Unit (Butcher, 2006), Western company executives with operations in China commented that China's schools were geared to individual excellence and academic brilliance but failed to teach the value of teamwork, which they regarded as an important character for success today (Butcher, 2006, p.14).

Despite the various labels attached to the generation of young people (self-centred, irresponsible, materialistic, reaching for things beyond their grasp etc.: Xu, 2005; YNET, 2008), some proposed that the 'Post-80s' concept was no more than a commercial label created by the media. The media, it was argued, deliberately exaggerated some of the characteristics of this generation of young people for their own economic benefit (Gao & Meng, 2007). Nevertheless, reports on a few cases could not represent the 'Post-80s' as a whole generation (Liu *et al.* 2008).

### ***3.4 The Post-80s and the Internet***

The Post-80s were a generation at the transition from print media and print culture to Internet culture, which made them distinct in China's 5000-year history (China News, 2009). While the 'Post-70s' lived in an age of printed media and printed culture and 'Post-90s' lived in an age when the Internet was already popular, it is the Post-80s who have

rejected the print culture and popularized the Internet culture. Such an era of transition has made a huge impact on modern China's political, economical and cultural development (China News, 2009).

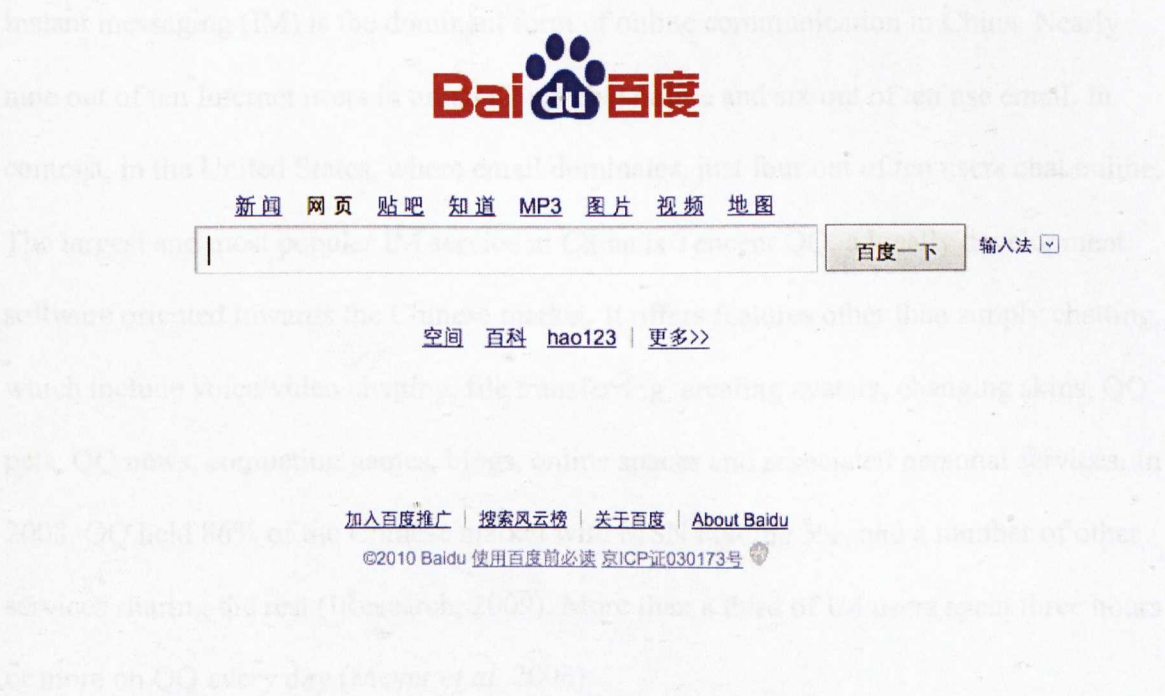
Born into a global information age, the Internet has provided them with the opportunity to access global information, the opportunity to participate in the discussion locally, and also the space to express themselves. They chat online, download music, play games, watch news and search for information online (Wang, 2005). Compared with the 'Post-70s' or previous generations, the Post-80s have grown up with computers and the Internet, which shaped their values and attitudes towards society (Wang, 2009). In the online world, they had the opportunity to communicate and exchange ideas with people all over the world.

The conventional wisdom has held that the Internet service in China lagged behind than the west (Hughes and Wacker, 2003). However, some of the locally developed software have been even more popular than the global provision, such as Tencent QQ (as shown in Figure 3.1), a local Instant Message software which is similar to MSN; Baidu (as shown in Figure 3.2), a Chinese local search engine comparable to Google; and Xiaonei (also called Renren or Kaixin, as shown in Figure 3.3), a local social networking site comparable to Facebook. This home-built software often offered more functionality to meet the needs of their users than the globally available alternatives.

Figure 3.1 Screenshot of Tencent QQ (English version)



Figure 3.2 Screenshot of Baidu





**Figure 3.3 Screenshot of Xiaonei**



On average, Chinese Internet users spent 2.7 hours per day online in 2009, a usage rate that is 0.4 hours a day more than the average in the United States (Michael & Zhou, 2010).

Instant messaging (IM) is the dominant form of online communication in China. Nearly nine out of ten Internet users in urban China chat online and six out of ten use email. In contrast, in the United States, where email dominates, just four out of ten users chat online. The largest and most popular IM service in China is Tencent QQ, a locally development software oriented towards the Chinese market. It offers features other than simply chatting, which include voice/video chatting, file transferring, creating avatars, changing skins, QQ pets, QQ news, competing games, blogs, online spaces and associated personal services. In 2008, QQ held 86% of the Chinese market with MSN holding 5%, and a number of other services sharing the rest (IResearch, 2009). More than a third of IM users spent three hours or more on QQ every day (Meyer *et al.* 2008).

Shah (2009) reported research on the technology usage of China's Generation Y Digital Natives in Shanghai, one of the wealthiest cities in China. He argued that today's Generation Y in China grew up in a post-revolution, liberalized China, with great purchasing choices from the latest technology devices to luxury global brands. Walking on the streets of big cities such as Beijing and Shanghai, one can expect to see large number of teenagers immersed in front of computer screens at Internet cafés, constantly playing on their mobile phones or game devices on public transport, or 'shooting' messages to their friends on screens.

In China, Internet cafés were considered as important locations to use the Internet and places often visited by high school students. According to the 2008 CNNIC report, more than half (57.3%) of users in senior high school and more than a third (39.3%) in junior high school used the Internet at Internet cafés, and the proportion is even higher in rural areas. Internet cafés first appeared in China in the 1990s, and have developed greatly in the past two decades. They play an important role in narrowing the digital gap as they provide many students who cannot afford to have their own Internet or computer the opportunity to access the Internet in a public place.

At the same time, there was a prevailing concern that a number of young people had become obsessed with the Internet (Beijing Statistical Information Net, 2006). They skipped classes and played games at Internet cafés; slept over night at Internet cafés; and some even forget to eat and drink, which threatened both their mental and physical health (CN2.cn, 2009; Fu, 2009). According to statistics from China's Youth Internet Association, 25.8% of primary school students in urban cities went online, together with 30% of junior school students and 56% of high school students in urban cities (China.com.cn, 2009). Based on data from over 10,000 young people in 12 cities, Young (1996) reported that almost 10% of all the young Internet users had 'Internet addiction disorder'- an excessive

computer use that interferes with daily life. Those aged 18-23 occupied the largest Internet addiction group, with men (13.29%) more likely to get addicted than women (6.11%) (Xinhua News, 2008). In order to deal with Chinese youth's obsession with the Internet, the Chinese government implemented a series of actions to prevent the Internet technologies from what was thought to be corrupting children, including enhanced management of Internet cafés, monitoring of online communications, limited access to certain sites, family guidance and even psychological therapy in extreme cases (see Xinhua News, 2004; Yichun Government News, 2008; News.cn, 2009).

### ***3.5 Access to technology and digital divide***

China's mobile and Internet users have increased significantly over the past few years (China Statistical Yearbooks). According to a China Internet Network Information Center report (CNNIC, 2007), China had 200 million mobile phone users and 59.1 million Internet users in 2002. By the end of 2007, China boasted the world's second largest number of mobile phone users (547 million) and Internet users (210 million). By the end of 2008, the numbers of Internet users in China had reached 298 million. While dial-up Internet connections are still used, broadband Internet users in China reached 270 million in 2008, accounting for 90.6% of the national Internet population. Over a third of Internet users (117.6 million) had access to mobile Internet, an increase of 133% from 2007. Of the emerging technology based tools, web 2.0 technologies such as blogs, instant message services, and RSS feeds were becoming particularly popular. As an example of user-generated content, blogs users maintained a rapid growth rate, reaching 107 million by June 2008. While online music (84.5%) remained in first position in the Internet application ranking, RSS feeds (81.5%) surpassed instant message services and became the



second most popular application in 2008. Instant message services (77.2%) were ranked third (CNNIC, 2008).

Although China had a large number of mobile phone and Internet users, the penetration was still low. According to the 23rd Statistical Report on China's Internet Development by the China Internet Network Information Center (CNNIC, January 2009), only by the end of 2008 did China's Internet penetration rate (22.6%) surpass, for the first time, the global average level (21.9%). By July 2009, the number of China's Internet users had increased continuously to 338 million, a 13.4% increase from late 2008, and Internet penetration had risen steadily to 25.5% (CNNIC, July 2009).

Although almost half of China's 1.3 billion people have access to computer, mobile, or both, there is a significant digital divide between people from urban areas and people from rural areas and between people from the eastern development regions and people from the undeveloped western regions. According to a Boston Consulting Group report, 80% of the 600 million urban Chinese citizens had access to either a PC or a mobile phone, while only 19% of the 725 million Chinese living in rural areas had access to PC or mobile phones (Meyer, 2008). Internet use was still largely an urban phenomenon, even though the urban-rural gap was likely to narrow gradually. In 2007, whereas three quarters of Chinese Internet users were from urban areas, the penetration rate in rural areas was only 7% (53 million Internet users out of 725 million rural Chinese). However, by the end of 2008, the number of rural Internet users had reached 84.6 million, an increase of 31.9 million from 2007 (CNNIC, July 2009).

In addition to the urban/rural division, the disparity between different regions in China was huge. Compared with the eastern coastal regions, a significant part of western China was still under-developed. In 2000, there were 592 counties in China living under the poverty

line, and more than half of them were located in western China. Among the poor, 58.6% lived in 12 western regions, 60.8% in 592 national poor counties, and 48.8% in mountainous areas. Out of the 31 provinces in China, 8 provinces had a poverty headcount rate less than 1% and 3 provinces above 10%. The majority of the provinces had a poverty headcount rate between 1% and 10%, while one western province that had the highest poverty rate of 15.6% (Rural Survey Organization of National Bureau of Statistics, 2004).

Besides low income, people in the western rural areas had far less access to education. Wang *et al.* (2009) reported the imbalance between the eastern developed areas and the undeveloped western regions. Schools in the eastern developed regions had good infrastructure facilities and students could receive quality education there, whereas conditions in some undeveloped regions was extremely low where children could not even go to school and receive education. A survey conducted in 1999 showed that illiteracy rates among people aged fifteen years and above in western China were as high as 35.79%, 14% higher than the national average (Rural Survey Organization of National Bureau of Statistics, 2004).

The imbalance in social and economic development also made young people in different regions develop different values and attitudes to society. According to a *China Daily* report (2003), some high school students were instructed to go back home and wash their parents' feet, as part of a special ethics programme. The aim was to remind today's 'little emperors' of traditional Chinese virtues, to restore their respect for elders and social and family responsibilities. This assignment was given to students in Henan, an inland province in central China, and Shanghai, one of the most developed coastal cities in eastern China. While 90% of the students in Henan province finished the assignments and wrote notes in loving tones, the reaction of students and parents in Shanghai received much media attention. Students called it irrelevant or even 'inhumane', while some parents agreed.

Some parents themselves could not understand the purpose of this activity; they believed it would be better for their child to spend the time doing something more meaningful. As the author commented, ‘many parents spoil their children in the name of education’ (*China Daily*, 2003).

### ***3.6 Empirical studies on students’ use of technology in China***

The Post-80s and their use of technology have become one of the most popular public discourses in today’s Chinese society. However, little empirical academic research had been conducted on this generation of university students’ use of technologies in higher education. According to Jiang Bing, a professor at Guangdong Business School who won two national research projects on the Post-80s and Post-90s use of media and Internet, no social scientist looked into the Post-80s or Post-90s specifically until 2009 (Guangdong Linnan Wenbo Yanjiuyuan, 2009). As part of Jiang’s projects, surveys would be conducted at nine universities in China, including Peking University and Fudan University etc, in an attempt to quantitatively measure the characteristics of the ‘Post-80s’ and their media habits. Nevertheless, there has not yet been any published works on any of these surveys to the best my knowledge.

Wang, Y. (2003) surveyed 92 students’ use of technology at China’s Northeast Normal University in Shenyang Province, focusing on three aspects: students’ technology awareness (whether they understood the information system), information ethics and technology literacy. The results showed that students had a low awareness of the source of information. Only 32 students understood where information came from compared with the other 60 students who were not aware of the source. Although these students were said to have been brought up in a digital world, contradictory results were obtained when they

were asked what their daily source of information was. Unlike what one might expect of Digital Natives, students obtained the majority of their information from printed materials rather than from digital sources. Almost 50% of the student participants said the best source of information was the newspaper. The information they obtained from digital resources (i.e Internet, CD, and media databases) was less than 30%. Furthermore, students showed a lack of understanding of intellectual property rights. Only 30% of the students were aware of individual privacy infringement and Internet crime. Their information ethics were at a low level and there was a need for educational opportunities. .

Wang, Lin and Mao (2003) also investigated students' computer skills and information literacy at university. Questionnaires were administered to 167 undergraduate students and 150 postgraduate students pursuing a master's or PhD degree at Beijing Normal University. The results showed that there was a gap between undergraduates and graduates in their computer skills. Graduate students had a lower level of computer proficiency compared with undergraduate students. In particular, graduate students who came from other universities or rural areas were less familiar with computers and had not received enough training during their undergraduate studies. Although the government endeavoured to promote students' information literacy, there was still a lack of implementation at the institutional or departmental level for various practical reasons. A number of universities still had not yet offered information-searching courses to their students. Without systematic and thorough training, students showed a lack of information-searching skills, which resulted in a gap between their information needs and their digital resources. In other words, students could not make good use of the available digital resources due to poor information literacy, and hence the digital resources freely available online could not help the students to meet their needs.

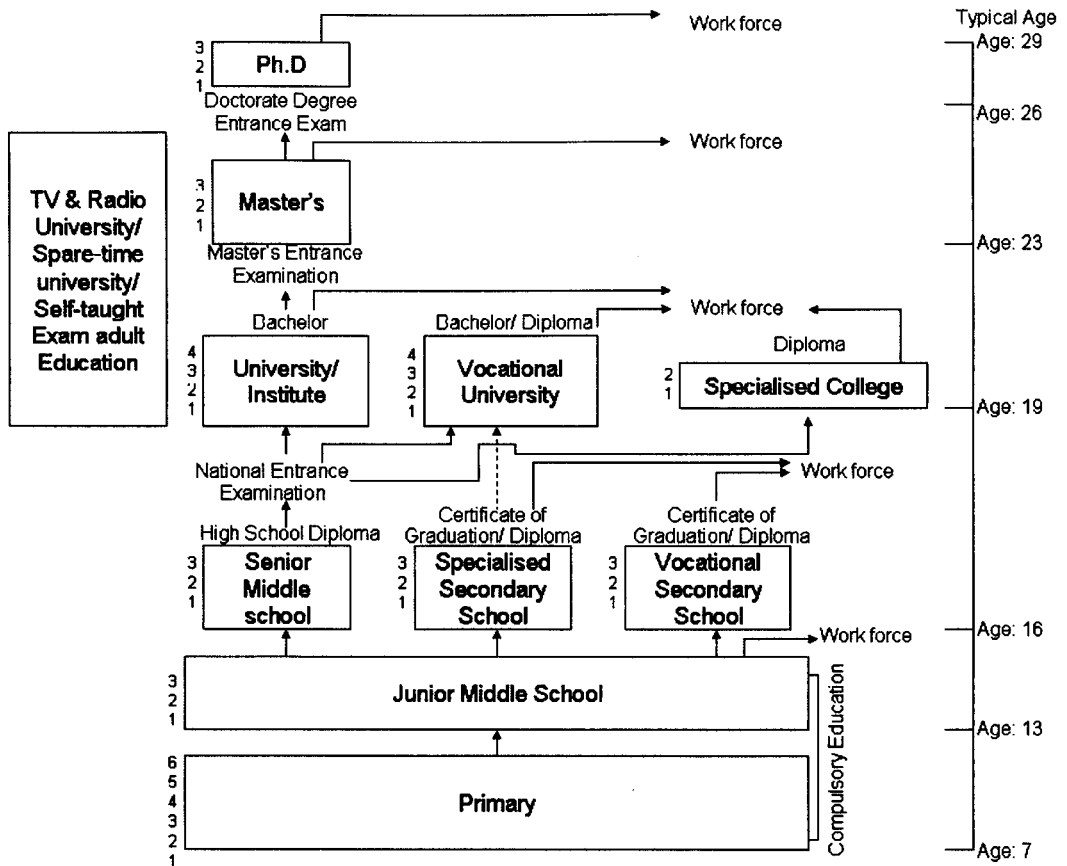
Following Wang, Lin and Mao's (2003) study, Wang (2007) surveyed 300 students in three universities in southern China (Fudan University, Tongji University and Shanghai Financial University) and found that a number of students had not received any training on information searching or attended any relevant courses at university. Due to a lack of computer training, students were not clear about the sources of information available to them in their field. Although there was a vast amount of information available on the Internet, students lacked the skills to search, find, and organize the information. Some of them had never used advanced search facilities; the majority only possessed basic skills using search engines (e.g. Google and Baidu). The four most popular online activities were watching news, watching movies, using forums, and playing games. Most of their online activities were for personal and entertainment purposes. Although English was a compulsory subject at school and university, students still had problems browsing English websites. Only 22% could understand any content from English websites, which undoubtedly limited the scope of their information searches.

In a more recent study, Li & Ranieri (2010) investigated the characteristics of a group of Chinese teenagers (ninth year students) in Ningbo, Zhejiang province in an aim to provide a 'piece of evidence' on the digital competence of the 'Digital Natives'. An Instant Digital Competence Assessment (iDAC) tool was adopted as the measurement tool for the study. The results showed that the teenagers' digital competence was just 'pass' rather than 'good' or 'excellent', and there were big disparities among participants in their digital competences.

### ***3.7 Educational policy in China***

Like most national educational systems around the world, education in China can be divided into three stages: primary education, secondary education and higher education. Higher or tertiary education in China includes regular universities, adult universities, technical and vocational education and training (as shown in figure 3.4 below). The focus of this study was on conventional campus-based university students who are pursuing bachelor's degrees in China from year one to three. Students in year four were opted out of the study because at the time of the field work, they were near graduation and were busy preparing for exams and jobs, thus not available to participate in the study. For most first-year students it was their first experience of higher education. The period of transition from secondary schools to higher education was very important in terms of both their academic and personal development. Second-year and third-year students were also included in an attempt to explore whether there was any change in their use of technology as they progressed at university and preparing to enter the workplace. For all years, a better understanding of students' expectations, current skills and learning habits with regard to technology use can help educationists and decision makers to provide better provision for students' needs.

**Figure 3.4 The educational system in China**



Graph based on data from the report of the Finnish National Board of Education. From Brandenburg & Zhu (2007, p. 6) (original source no longer available)

The teaching of Confucius has largely shaped the Chinese mindset for the past 2500 years. However, advances in science and technology in western countries have also played an important role in the nation's education development. The Chinese government has attached great attention to international cooperation and academic exchanges since the reform and opening up to the outside world in the 1980s. In the past 20 years, China has established partnerships and cooperative relationships with more than 154 countries, sent over 300,000 students abroad, and received over 210,000 students from around the world (Ministry of Education website). The partnerships have offered mutual economic benefits and promoted mutual understanding and development between China and other countries.

China is a nation with a long history, but its modern education system is relatively new. Since the founding of the People's Republic of China in 1949, Chinese society has undergone tremendous changes in its social economic, political and cultural arenas. In 1952-1953, under the leadership of Mao Zedong, the government abolished the old academic degree system and established a Soviet-style graduate school. However, during the Cultural Revolution (1965-1977), a 12-year suspension of degree enrolment resulted in a great loss of higher education institutions, as well as an entire generation of scholars.

With new national policies for reform and the opening up of the country to the outside world in 1978, the Chinese government resumed university education in China and gave priority to its development. As the core of the Chinese Communist Party's second generation central leadership group, Deng Xiaoping continuously emphasized the significance of developing education, science and technology in Chinese social modernization from the late 1970s to the beginning of 1990s. Deng concluded that science and technology constitute a primary productive force, and that education was the basis of scientific and technological development. It was marked in his 1983 'speech of three facings' that 'education should face modernization, the world as well as the future' (China Education News, 2009; Xinhua News, 2009). In order to achieve that goal, education in China should accept the challenges of modernization: education should be open to the whole world, as well as being combined with high-quality research to produce the innovative talents needed in the future. Deng Xiaoping's views greatly pushed forward China's economic and social development and functioned as the theoretical foundation for the development of higher education.

Since the 14th National Congress of the Communist Party in 1992, education has been designated as a strategic priority area for development. It has been clearly noted that 'education must be placed in the strategic position of priority development, and strive to



improve the whole nation's ideological, moral, scientific and cultural level, which is the fundamental plan of China's modernization' (News of the Communist Party of China, 1992). Following the conference, the Central Committee of the Party and the State Council developed *The Outline of Innovation and Development for Chinese Education* and *The Executive Recommendations for the Outline* in 1993 and 1994 respectively, which formulated a framework of Chinese education development and innovation in the 1990s and the early 2000s.

A strategy entitled *Developing the Nation through the Promotion of Science and Education* was proposed at the Sixth Plenary Meeting of the Fourteenth Central Committee of the Party in 1995, and *The Ninth Five-year Plan and Developing Program for Chinese Education in 2010* were developed along with the overall national social-economic development plan in 1996. In relation to the strategy of *Developing the Nation through the Promotion of Science and Education* and strategy of sustainable development, the Report of the Party's 15th National Congress pointed out that: 'Developing education and science is fundamental in the engineering of culture construction. To train high quality workers in numbers of hundreds of millions and a wide range of professional personnel in the tens of million which are required for modernization, and to take full advantage of the huge human resources of our nation, all of these are relevant to the overall destiny of socialist construction in the twenty first century. We should make sure that education is made a strategic priority for development' (News of the Communist Party of China, 1997).

In 2002 at the 16th National Congress of the Communist Party, General Secretary Jiang Zemin remarked that, as human society entered the 21st century, China had started a new phase of development for building a prosperous society in an all-round way and speeding up socialist modernization. One of the objectives of education is to build a learning society

where all the people can learn or even pursue life-long education to boost their all-round development.

More recently, in 2007 the 17th National Congress of the Communist Party reconfirmed these guidelines and drew up a blueprint for further innovation and educational development in China in the 21<sup>st</sup> Century. Secretary General Hu Jintao clearly pointed out that ‘China should attach priority to developing education and building China into a power of human resource.’ (News of the People’s Communist Party, 2007). Education should be developed as a priority to help train more skilled people for building a moderately prosperous society and propelling socialist modernization.

Abiding by and implementing the strategy of *Placing Education at a Strategic Position of Priority*, Zhou Ji (2007), Chinese Minister of Education, addressed the Opening Ceremony of the Beijing Forum as follows:

Education is the cornerstone for national revitalization and social harmony; it is also the foundation for inheriting civilization and promoting prosperity. With the further development of global economy and the fast-progressing science and technology, knowledge is becoming the decisive factor in improving the overall national strength, and talents are becoming more and more a strategic resource for economic and social development. The role and position of education, which serves as the foundation and vanguard and has an overall bearing on national economy, have become even more prominent.

(Beijing Forum, 2007)

These policy statements present the broad governmental priorities for national education, especially for higher education in the 21st century.

Compared with western industrial advanced countries, China had a slow start in its efforts to integrate technologies into education due to its economic development and shortage of resources in early 20th century. It's only in the 1990s when China's economic construction and social development became ever more evident, that the Chinese government has recognized the importance of information technology to the future development of the country and started to promote the use of ICT in education. Several mandates have been issued. In 1999, the Chinese Ministry of Education (MoE) initiated a massive infrastructure programme to encourage the use of e-learning to leverage education at all levels: in traditional on-campus universities, in distance-learning institutions and in rural areas for educational provision (Spencer-Oatey, 2008). Again in 1999, 'Looking toward the Twenty-first Century Education Promotion Action Plan', approved by the State Department, clearly emphasized the importance of education in national development and identified e-learning as one of the nation's ongoing projects. As Zhou Ji (2006: 229), the Chinese Minister of Education noted, 'if education is to serve social progress and economic development, the information technology (IT) for it must advance ahead of social progress'.

While effective use of ICT to transform education entails the profound integration of ICT in all aspects of the school: including integrating ICT to perspectives of teaching, learning, professional development, pedagogy and social culture, the construction of ICT hardware and infrastructure facilities in China has only been speeded up since 2000. Differences exist between developed regions and undeveloped/rural regions. Many big cities in Eastern China have established their metropolitan educational networks, which connect the educational information centre in central cities, LANs at district levels, and the networks in

all schools (Zhang, 2004). The use of more integrated web-based learning environments (VLE/LMS) has been implemented in some course modules and universities, but it is not yet universal. Against this background, this study aims to investigate how the technological and social context might be influencing young people's use of technologies in and to explore how ICT could be better incorporated for teaching and learning in Chinese higher education.

# Chapter 4 Research Design and Methodology

## *4.1 Introduction*

This chapter outlines the details of the methods employed in this study. Firstly, the primary and subsidiary research questions are presented and discussed in section 4.2. Then section 4.3 explains the mixed-methods research paradigm adopted in this study and justifies the choice of methodology. Section 4.4 introduces the setting of the study and the sampling strategy. Section 4.5 presents the data collection methods and the data collection procedures in their chronological order. Prior to the main study, a pilot study was conducted with students from University B<sup>5</sup>; details of the pilot study, preliminary findings and its implications for the main study are presented section 4.6. Section 4.7 focuses on the justification for the analytical framework and how both quantitative and qualitative analyses are conducted in this study. Validity, reliability and ethical issues are discussed in section 4.8. Finally, section 4.9 provides a brief summary of the methodology chapter as preparation for the next chapter on the findings and results.

## *4.2 Research questions*

The research purpose of this study was to explore how university students in China use technologies in their daily activities and to support their learning. Drawing from the literature, it also set out to explore whether there was any relationship between students' use of technologies and their gender, year of study and discipline. The investigation focused both on some of today's established technology and on emerging technology-

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<sup>5</sup> University B remained anonymous

based tools including: instant messaging; social networking; blogging; wiki; RSS feeds; podcasting and mobile technology. The aim was to gain a better understanding of today's university students' perceptions of and use of technologies in their lives, and to explore the ways in which technologies could be harnessed for educational purposes. It was believed that a better understanding of students' attitudes, beliefs and behaviours would help educators make better pedagogical decisions to meet the needs of learners' in the 21<sup>st</sup> century in China.

Thus the main research question is: How do university students in China use technologies in their daily activities and to support their learning? Developing from this main research question, there are five sub-questions:

- How do university students in China use technologies in their daily activities?
- How do university students in China use technologies to support their learning?
- Is there any variation in students' use of technologies across disciplines?
- Is there any variation in students' use of technologies across years of study?
- Is there any gender difference in students' use of technologies?

## ***4.3 Research approach***

### **4.3.1 Research philosophy**

For decades, qualitative and quantitative research have been conceptualized as two fundamentally different paradigms through which one could study the world. While qualitative research is often associated with interpretivism (Kuzel and Like, 1991; Secker *et al.* 1995) and constructivism (Guba and Lincoln, 1994); quantitative research often links

to positivism and post-positivism (Bergman, 2008). The ontological position of the qualitative paradigm believes there exists multiple realities based on one's subjective construction of reality (Berger and Luckmann, 1966). The researcher and the object of study are mutually interactive and inseparable (Guba and Lincoln, 1994; Denzin and Lincoln, 1994). In contrast, the quantitative paradigm believes that there is only one truth, an objective reality that exists independent of human perception. Epistemologically, the investigator and investigated are independent entities. Since the two approaches have different assumptions about the reality of the world, their methodology for conducting the research involving the research questions, data collection methods, sampling and data analysis is different. In general, quantitative approaches focus on the use of numbers and scales to represent the world while qualitative approaches provide an in-depth description and analysis of the human experience (Marvasti, 2004).

These distinct philosophical grounds of qualitative and quantitative research have led to a paradigm debate, which was called the 'paradigms war' (Creswell, 1994; Datta, 1994; Lincoln & Guba, 2000; Teddlie & Tashakkori, 1998). A major component of the paradigms debate was the incompatibility issue, which stated that it is inappropriate to mix qualitative and quantitative methods due to fundamental differences in the paradigms underlying the methods (e.g., Guba, 1987; Sale, Lohfeld, & Brazil, 2002; Smith, 1983; Smith & Heshusius, 1986). This incompatibility issue is associated with the belief that paradigms and research methods are corresponded. If the underlying premises of different paradigms conflict with each other, then the methods associated with each paradigm should not be used together. Influenced by such a view, the two groups of researchers often have to defend their approach as the right way by emphasising only its strength and ignoring the fact that 'a good work is not a direct outcome of being faithfully committed to one or another way of doing research' (Băban, 2008, p.337).

Some mixed methodologists countered the incompatibility issue by positing a new paradigm: pragmatism (Howe, 1998; Maxcy, 2003; Morgan, 2007; Johnson & Onwuegbuzie, 2004; Bryman, 2006). As the third major research paradigm (Tashakkori & Teddlie, 2008), pragmatism bridges the ontological and epistemological differences between qualitative and quantitative methods (Guba & Lincoln, 1994). While positivists & post-positivists believe in an objective, external reality, whereas constructivists believe in multiple, subjective realities (Greenberg & Folger, 1988), for pragmatists there are in essence two parts to their view: firstly, they agree with positivists and post-positivists that there is an external reality; secondly, they deny that there is an absolute truth (Tashakkori & Teddlie, 1998).

#### 4.3.2 The mixed-method approach

Despite the obvious differences between quantitative and qualitative research, it is believed that these two approaches should be considered complementary rather than as rivals in educational research for the purpose of this research. Rejecting the either-or choices of quantitative and qualitative methods, the mixed methods approach offers an alternative and combines both quantitative and qualitative methods (Tashakkori and Teddlie, 1998). In the core concept of the mixed methods approach, the focus is on quantitative and qualitative methods being compatible (Howe, 1988). Howe (1988) described the thesis as follows: 'The compatibility thesis supports the view, beginning to dominate practice, that combining quantitative and qualitative methods is a good thing and denies that such a wedding is epistemologically incoherent' (p.10).

The mixed-methods approach regards both quantitative and qualitative research as important and useful (Johnson, Onwuegbuzie, & Turner, 2007). It is used as a means of



avoiding biases intrinsic to single-method approaches, or in other words, as a way of compensating for the specific strengths and weaknesses associated with particular methods. By utilizing both quantitative and qualitative techniques within one framework, the goal of mixed methods research is not to replace either of these approaches but rather to incorporate the strengths and minimize the weakness of both (Johnson and Turner, 2003; Onwuegbuzie & Leech, 2004).

In this study, a mixed-method approach (Creswell, 1994) was used to guide the design of the research, as neither quantitative nor qualitative approach alone would provide adequate findings for the research. Mixed methodologists present an alternative to the quantitative and qualitative traditions by advocating the use of whatever methodological tools that are required to answer the research questions (Teddle & Tashakkori, 2009). Researchers who conduct mixed-methods research select methods and approaches with respect to their research questions, rather than with regard to some preconceived epistemological considerations (Teddle & Tashakkori, 2009). Underpinned by such principles, the purpose and research questions are the main selection criteria for methodology in this study. In an aim to investigate how Chinese university students in China use technologies in their daily life and to support learning, it is appropriate to consider both quantitative surveys and qualitative focus group interviews.

Despite the different ontological and epistemological positions often associated with qualitative and quantitative research, both quantitative and qualitative approaches have their own strengths and limitations. For example, quantitative surveys are generally objective, easy to replicate and generalize. Nevertheless, quantitative surveys often fail to account for the depths and details and often take place in an unnatural setting where the researcher creates artificial environments in an attempt to control relevant variables.

Moreover, the results of quantitative approach may be statistically significant but are humanly insignificant. Conversely, qualitative interviews provide depth and detail which are hard to achieve using a quantitative approach. However, the analysis and interpretation of qualitative data can be subjective and dependent upon the researcher's personal attributes and skills, and the results of qualitative research are less generalizable.

#### 4.3.3 Research design

As stated above, the focus of research in this study was to explore young people's current use of technologies in China and to explore the ways in which the technologies could be harnessed for educational purposes. Understanding Chinese students' learning experience in relationship to their use of technologies involves the examination of their lived experience as well as the statistical analysis of students' demographic features, their use of, skills levels with technologies and the potential relationships between them. In view of this, both quantitative and qualitative data was sought to answer the research questions including (1) a survey on students' attitudes towards, frequency of use and self-perceived skill towards a range of technologies and technology-based-tools, and (2) follow-up focus group interviews with a selected number of student participants who had responded to the questionnaires.

A survey on Chinese university students' use of technologies was the cornerstone of the quantitative data collection process. A paper/pencil survey was used to avoid biasing against people who felt less comfortable filling out web forms or spent less time online and thus may have had less of an opportunity to participate. Students were asked about the degree to which they accessed and used technology-based tools, how they currently used technology to exchange information and knowledge, their skill levels with different

technologies and their perceptions of how technologies could be used to assist with their studies.

Survey was chosen because it was most useful for revealing a broad range of students' use of technologies within a university. Another important strength of a survey was that it enabled the researcher to collect a large quantity of data in a relatively short period of time. The data collected is easy to code and analyze (Thomas, 2003). Compared with qualitative in-depth interviews, a quantitative survey keeps the researcher from 'contaminating' the data through personal involvement with the students (Thomas, 2003). However, it is also acknowledged that, since the typical survey focuses on reporting the overall experiences of the target group within a collectivity, it often fails to show the unique way that each individual pattern fits within the group. In other words, though a quantitative survey could provide a statistical summary of students' use of technologies within the university, it failed to describe the qualitative features that make up the uniqueness of each student's experience.

Thus, a number of participants were selected from student volunteers to take part in a follow-up group interview after the survey. The aim was to direct a deliberate dialogue with the students to obtain descriptive information of their unique experience in their own words (Bogdan & Biklen, 2003) and to clarify any uncertain answers in the survey. Any critical issues arising from the survey were explored through the subsequent use of focus group interviews. As a complement to breadth of insight provided by the quantitative survey, the qualitative group interviews provided depth. They also allowed the triangulation of data collected from different sources and the validation of the results. In a word, the use of both survey and focus groups drew out the strength of both quantitative and qualitative methods and provided perspectives of the research problem from both a macro and micro level.

## 4.4 Setting and sampling

The study utilized a sample that included undergraduate students following degree studies at University A. In one sense, the sample for the study was a convenience sample because the researcher had worked with the university before and the university showed interest in taking part in the study. It was also a purposive sample because of its relationship with the theoretical purpose of the study. The study aimed to investigate students' use of technologies at regional Chinese universities across years and disciplines, and University A is a regional Chinese university located in mid Eastern China that is fairly typical in terms of the student population and the development of the institution itself.

### 4.4.1 Setting of the university

University A is a private owned four-year comprehensive university located in Jinan, capital city of Shandong province, China. Accredited by the Ministry of Education of China, University A grants bachelor's degrees, associate degrees, and diplomas to students in over 50 programmes. One of the top ten privately owned institutions in China, it has attracted a student body of over 20,000 from across the nation.

Shandong is a coastal province of eastern China and has the second largest population in China (Xie *et al.* 2008). It ranks first among other provinces in the production of a variety of goods, including cotton and wheat as well as precious metals such as gold and diamonds. Being the biggest industrial producer and one of the top manufacturing provinces in China, Shandong's nominal GDP was 3.11 trillion Yuan in 2008, ranking second in the country (Ma *et al.* 2009). It is also one of the most important places in the origins of ancient

Chinese culture. The land has cultivated numerous great people in different walks of life including social, political, historical, artistic and scientific. The most famous was Confucius, whose teaching had a profound influence on Chinese society for thousands of years. As part of the research, I was also interested in exploring whether traditional Chinese teaching still had an impact on students' learning at universities, in particular with regard to the use of technologies.

***Figure 4.1 Map of China, showing Shandong Province***



Compared with decades of technology use to support teaching and learning in the west, the development of ICT education in China was still in its early stages. Although technologies have been applied to many classrooms across the nation, the degree of actual integration varied from university to university and from teacher to teacher. For instance, Ge and Ruan (2011) reviewed various resources on the use of ICT in Chinese literacy education over the past ten years and categorized the use of ICT in various instructional contexts into: 1) standalone multimedia courseware - created with Microsoft Powerpoint or interactive web development software such as Adobe Flash; 2) character encoding and input system - to

help students learn Pinyin and Chinese characters; 3) communication tools- such as emails instant messages, social networking tools and other online collaborative applications; 4) mobile technology - use of mobile phones, digital PDAs and pocket PCs; 5) corpora - a large language database for literature education; and 6) institutional delivery devices, i.e. LCD projectors and whiteboards.

The university being studied has a typical technology setting. There are five computer rooms on campus, each with about 60 Windows XP computers available to use. Many of the classrooms are equipped with central computers and projectors where teachers could use multimedia courseware to assist teaching. All the computers on campus are LAN connected and students could connect to broadband internet in their dormitory if they wished. There is no difference in technology provision across disciplines, although different disciplines would have different focus on ICT according to their specific curriculum requirements. Students also have access to online discussion forums, online library, and a student homepage where they can choose which courses to take and check their grades.

#### 4.4.2 Selection of participants

In all, 2920 students taking 3 year undergraduate courses from eight disciplines at University A took part in the study. Within the university, stratified samples were constructed so that students were recruited from eight disciplines, including the Department of Electronics and Information Engineering, Computing and Information Technology, Pre-school Education, Civil Engineering, Art and Design, Economics and Management, Mechanics and Automation, and Foreign Languages. Due to the scheduling of the academic terms at the university, only students from year one to three could be

recruited. In total, students from eighty general education classes were included in the survey. The aim was to reflect the diversity in students' demographic features, including gender, year level and discipline.

Once the principal of University A had approved my request to carry out the study, contact was made with the university's central student office, who helped me to identify the available target group. Given the selection criteria, which were to include student representatives ranging from year one to three across different disciplines, the central student office identified 3500 students from over eighty general classes for me to contact.

Of the 3500 who were contacted, 2920 students completed and returned the questionnaire. At the end of the questionnaire, the students were asked whether they would be willing to take part in a follow-up interview. From those who showed their interest to take part, 29 students were selected to take part in the group interviews. Intensity sampling (Glaser and Strauss, 1967; Patton, 2001) was used to select the interview participants, the aim being to include students of different year levels, disciplines and experiences with technology. At least one student was included from the lower year level (year one or two) and one student from the higher year level (year three) in each department (Computer and Electronics; Education; Civil Engineering; Art and Design; Economics and Management; Mechanics and Automation; and Foreign Languages). Based on the selection criteria and the students' answers to the questionnaire, twenty nine volunteers attended the focus group interviews.

#### ***4.5 Data collection methods***

With respect to the research questions above, a mixture of both quantitative and qualitative data were collected in the study. The main data collection methods consisted of a survey

questionnaire and focus group interviews with selected student participants.

#### 4.5.1 Data collection

Initial contact was made with the principal of University A. After the principal approved the study to be carried out at the university and signed the permission form, packages were assembled, each containing an information letter, a copy of the survey questionnaire and an addressed envelope (Appendix A contains an English translation of the information letter, Appendix B contains an English translation of the questionnaire, the original information letter and questionnaire are in Chinese). With the help of the central student office, 3500 students from eighty general education classes across eight disciplines were invited to take part in the study.

Having identified the target group, each of the eight heads of department was contacted to approve administration of the questionnaire to students enrolled in their department. They were provided with the permission from the principal, information letter and a copy of the questionnaire. Individual instructors from each class were asked by the department director to help me distribute the survey and to read the information letter to their students. The survey was distributed at the end of a class in order to minimize the loss of dedicated instruction time.

The information letter contained statements introducing the purpose of the study and indicated that participation in this study was voluntary and that any information obtained from the participants would remain confidential and used only for the purpose of this research. The students were not required to place their name or any identifying information on the questionnaire, apart from those who volunteered to take part in the focus group left



their contact numbers. Return of the completed questionnaire was taken to imply the participant's consent. The questionnaires were administered from May to July 2009. In total, 2920 students (or 83.4% of those identified for the survey, discounting those who were absent from their classes when the questionnaire was distributed) completed and returned the questionnaire.

As a follow-up to the questionnaires, face-to-face interview sessions were conducted with selected student volunteers. As planned, two group of students were selected from each of the eight disciplines (Electronics and Information Engineering; Computing and Information Technology; Pre-school Education; Civil Engineering; Art and Design; Economics and Management; Mechanics and Automation; Foreign Languages), one from lower years (year one or year two), the other from the higher year (year 3). Some of the interviews were conducted on a one-to-one basis; others were conducted in a small focus group consisting of two or three students. All of the interviews were conducted in mandarin Chinese and were audio-recorded (permission were obtained explicitly with the participants). The aim was to provide an opportunity for students to share their experiences with technologies and to explore the ways that technologies could be used for educational purposes.

#### 4.5.2 The survey instrument

A survey on students' use of technologies was developed, drawing upon existing instruments from studies on the Net Generation in western countries, in particular, Kennedy *et al.* (2006; 2007; 2008) in Australia and Jones (Jones *et al.* 2010; Jones & Cross, 2009; Jones & Ramanau, 2009a, 2009b) in the UK. Fink (2002) suggested the principles of effective survey questions: that they should be simple, clear and designed from the

respondent's perspective. These were followed in the design of the questionnaire in this study. Demographic variables were identified so that the responses could be related to the participants' age, gender and discipline. The questionnaire was designed to provide more than a snapshot of technologies use, but also sought to find out more about a broader range of students against which to compare the smaller sample who would be participating in the qualitative investigation included in the study.

The questionnaire (Appendix B) mainly consisted of four parts.

The first part of this survey instrument contained four items designed to elicit the respondents' demographic information, including age, gender, program level and field of study. In part two respondents were requested to identify the kinds of technology they had access to and to rate how frequently they used each kind of technology on a five-point scale, ranging from 1 to 5 (where 1= very often, 2= often, 3=sometimes, 4=occasionally, and 5=never) across a range of applications (audio, video and images; messaging and chat; social networking sites; wikis, blogs and web 2.0; mobile phones; games/entertainment; Microsoft Office programme; and learning programmes for university studies).

Part three measured respondents' perceived computer skill levels with the technology. Again, a five-point scale across the same range of applications was used, this time ranged from '1' representing expert level to '5' representing novice level.

The last part used multiple-choice and open-ended questions to explore the respondents' experience and expectations of using technology at university. Here, respondents indicated how they perceived and for which purposes they used technology in the courses that they were enrolled in. Additionally, respondents were asked to rate the level of importance to them of certain technology assisted learning activities and to rate whether they felt that

certain technology did an adequate job of meeting their expectations as related to learning.

The questionnaire was first designed in English and then translated into Chinese, since the respondents of the questionnaire were students from mainland China. To ensure the accuracy and consistency of the translation, the Chinese version of the questionnaire was translated back into English. This back-translation was compared by two doctoral students who were proficient in both languages prior to the administration of the questionnaire.

#### 4.5.3 Interviews

The interview data were gathered as a complement to the survey. As explained earlier in 4.3.3, a focus group interview was adopted because it could provide the researcher with an opportunity to talk to the participants face-to-face, clarify any unclear responses to the questionnaires, ask follow-up questions and explore the issues in more details. Meanwhile, the format of the focus group interview also gave the participants an opportunity to speak freely in their own voice, in comparison to the questionnaire, which they could only response to the categories of questions that had been pre-defined for them. Compared to the questionnaire, the focus group could also portray the individual students' accounts in a natural setting.

A focus group is a form of group interview where the participants interact and discuss a common topic supplied by the researcher (Morgan, 1997), rather than the emphasis being on questions and answers between the research and the participant. A focus group, however, relies on the interaction among the participants, and insight and data emerge from that interaction (Cohen *et al.* 2000). Compared with individual interviews, a focus group is more convenient and efficient to get information from a group of people belonging to a particular unit. The interactive nature of small group activities makes them

more engaging and appealing. Interaction within the group allows students to ask questions of each other, as well as to re-evaluate and reconsider their own understanding of their specific experiences (Kitzinger, 1995). If a focus group works well and trust develops, the participants may explore the topic and find solutions as a unit, rather than as individuals (Kitzinger, 1995). In addition, students of the same department and degree level who have had similar experiences may be less intimidated and more involved during the discussion. Thus, students within the same department and at a similar degree level were included in the same focus group discussion.

Despite the benefits of using focus groups, potential disadvantages were also acknowledged. For instance, a focus group can be intimidating at times, especially when members are inarticulate or shy. People with an extrovert character or strong opinions may tend to dominate the discussion and 'bully more timid members of the focus group into expressing opinions they would not admit to in private' (Descombe, 1998, p.115).

Researchers as moderators have less control over the data produced than in one-to-one interviews (Morgan, 1988). The moderator has to allow the participants to ask questions and to express doubts and opinions to each other, while having little control over the interaction other than generally keeping them focused on the topic. Moreover, it is not easy to assemble a focus group and to get a representative sample (Gibbs, 1997). This is also why some of the interviews were conducted individually. The format may discourage certain people from participating (for example, those who are less articulate or who have communication problems or special needs). The method of the focus group is not fully confidential and anonymous, and some people may be discouraged from trusting others with sensitive or personal data. Finally, it is difficult to record the discussion of focus groups as the participants may interrupt each other and talk simultaneously (Denscombe, 1998).

Bearing all that in mind, when conducting the focus group discussion, students were first welcomed with a brief introduction of the project, the purpose of the discussion and general guidelines. Students were also asked to sign a consent form if they agreed to take part in the discussion. When facilitating the discussion, probing questions were used to classify and follow up the main themes from the contributor's statement. Interview questions were examined after pilot interviews to make sure that the questions made sense and concerned matters relevant to students' conversational patterns. As I completed each interview, I examined what I had learned from the interview and what I needed to find out more about. During the ongoing analysis, the main questions were modified and follow-up questions were added to pursue emerging ideas which might be important for the research.

All the focus group discussions were audio recorded with a digital tape recorder; written notes were also taken to highlight key words and topics brought up during the discussion. Group meetings were arranged at suitable times for all the participants in each group. The time spent with each group ranged from one hour to an hour and a half. This was to ensure that all participants had a chance to express their points of view, while not getting bored with the discussion after a while. Prior to the focus group, questions were pre-tested with students from the selected departments. In all, a series of focus group interviews involving 29 students were conducted to gather more qualitative data from the students. Table 4.1 illustrates the numbers of participants in each department and degree levels.

Table 4.1 Interview participants

Departments	Year 1	Year 2	Year 3
Computer and Electronics	2		2
Pre-school Education	2		3
Civil Engineering		3	2
Art and Design	1		
Economics and Management		2	2
Mechanics and Automation	3	2	2
Foreign Languages	1		2
Total (29 students)	9	7	13

4.6 The pilot study

Before the main study, a pilot study was conducted during February 2009 with students from University B. The purpose was to gain insight from the experience of actually implementing of the research that could help to refine the design of the main study. Furthermore, the pilot study could also help me to gain experience of practical issues involved in conducting the study. In particular, the pilot study explored whether the questionnaire was feasible in implementation and to what extent it could achieve the goal of the study.

A small-scale research project was implemented in an Educational Technology course offered to 193 third-year students from the Department of Social Sciences at University B. One of the objectives of the course was to make students aware of the educational potential of the new technologies and to actively engage them in the use of these resources in their teaching and learning. A questionnaire on students' demographic features, access to, use of

and self-reported skills of a range of technology based tools was administered to student participants through the Internet. With the approval of the teachers in charge, a Chinese version of the questionnaire was uploaded to University B's central survey service. For practical reasons, invitation letters were given to the students by their teachers during the class on behalf. The invitation letter included a description about the project, contact details of the researcher and a link to the web survey. Students were also reminded to fill in the questionnaire a week after the original invitation letter.

#### 4.6.1 Preliminary results from the pilot study

In total, sixty three students completed the online questionnaire. The students who participated in the questionnaire were born between 1986 and 1990, aged between nineteen and twenty three at the time of the study. More women than men responded to the questionnaire (fifty six females and seven males, which reflected the gender distribution of the class), and all of the students were from a Chinese speaking background. All their answers were used in this analysis as they were all born after 1982, which fit into the targeted sample.

##### ***4.6.1.1 Time spent on a computer***

According to the data, more than half of the students surveyed (57%) spent on average one to three hours on a computer every day. The number of students who spent one hour or less on a computer per day (22%) was slightly higher than those spent three to six hours on average (14%). Only a small number of participants (2%) spent more than 6 hours or above on a computer per day.

There was also a gender difference in the average time that students spent on a computer. In general, male students spend more time on a computer than female students. 29% of male students spent three to six hours per day compared with 16% of the female population. Moreover, 14% of the male students spent more than six hours per day while only 1.6% female students did so.

#### ***4.6.1.2 Students' access to technology***

**The majority of the students had unrestricted access to a number of different types of hardware. A high proportion of students had unrestricted access to a desktop computer (64%) and a laptop computer (70%). Additional analysis showed that 34% of students had unrestricted access to both a desktop and a laptop computer while only 2% (n=1) of students had access to neither. While unrestricted access to mobile phones was almost universal (94%), none of the students had access to PDAs (0%). A relatively high proportion of students had unrestricted access to MP3 players (86%) and USB memory sticks/SD cards (79%). 25 students had unrestricted access to a webcam (40%), but this technology was nowhere near ubiquitous with around three-fifths of the student body having no access to them. Finally a small number of students (6%) had unrestricted access to a handheld game player, and none of the respondents (0%) had unrestricted access to console game player. This data is of particular interest for the research as one of the main characteristics that has been used to define 'Digital Natives' is their pervasive use of digital technologies. It makes one query whether the term 'Digital Natives' is applicable in China.**



Table 4.2 Unrestricted Access to Technology

Technology	Number of participants	Percentage
1. Desktop computer	40	64%
2. Laptop computer	44	70%
3. Mobile phone	59	94%
4. PDA/ Palm sized computer	0	0%
5. MP3/ iPod/ Digital music player	54	86%
6. USB memory stick/ card	50	79%
7. Handheld games player	4	6%
8. Console games player	0	0%
9. Webcam	25	40%

Table 4.3 below presents the students' responses concerning their access to the Internet. A high proportion of students reported that they had unrestricted access to the Internet. Interestingly, many more had access to broadband (91%) than had dial-up Internet access (13%) or wireless Internet access (13%). Only 1 person reported that he had no unrestricted access to the Internet at all, while only 3 students relied solely on dial-up access (5%). This raised interesting issues on 'Digital exclusion', and the proportion of students who had no access to the Internet is worth more in-depth investigation in future research.

Table 4.3 Unrestricted access to Internet

1. Dial-up Internet access	8	13%
2. Broadband access	57	91%
3. Wireless Internet access	8	13%

Although it would have been interesting to explore the possibility of gender differences in students' access to technology and the Internet (Desktop computer, Laptop computer, Mobile phone, PDA/ Palm sized computer, MP3/ iPod/ Digital music player, USB memory

stick/ card, Handheld games player, console games player, Webcam, dial-up Internet, broadband Internet, and wireless Internet), statistical analyses could not be carried out because of the small number of male students in the sample.

**4.6.1.3 Students’ attitudes towards using computer and other technology tools**

The majority of the students surveyed (82%) reported that they enjoyed using computers and other technologies, while only one student (2%) reported that he did not like using technology. In a follow-up talk with the pilot participants, they pointed out that that the response scale of the questionnaire was not consistent with the later questions. Thus a five point scale was adopted for the main study.

Table 4.4 Students’ Attitudes towards computer and other technology

	Frequency	Percent
I don’t like using technology very much	1	2
I don’t mind whether I use technology or not	10	16
I quite enjoy using technology	46	73
I enjoy using technology very much	6	10
Total	63	100.0

**4.6.1.4 Students’ experience with technologies**

The next section in the questionnaire asked students about the degree to which they used a range of technology based tools in seven areas: a) audio, video and images; b) messaging and chat; c) social networking sites, wikis, blogs and web 2.0; d) mobile phones; e) games; f) computer software; and g) university life. The results for the different technologies are presented in Tables 4.5 to 4.11.

4.6.1.4.1 Audio, video and images

Table 4.5 shows that listening to an audio file or podcast was clearly an activity enjoyed regularly by a large proportion of students. 72% of the students listened daily or weekly and 19% listened more than once a day, while only 2% had never done so.

Table 4.5 Audio, video and images

	Very often	Often	Sometimes	Occasionally	Few	Never
Listened to an audio file (e.g. MP3) or a podcast	19%	43%	29%	5%	3%	2%

\*very often (more than once a day)    often (daily)    sometimes (once or twice a week) occasionally (once or twice a month)    few (less than once a month)    Never (never)

4.6.1.4.2 Messaging and chat

All the students (100%) had used the web to send and receive email and for instant messaging. While there was some variation in the frequency with which students engaged in these activities, the vast majority used the web for these purposes regularly. 91% of students sent or responded to emails daily or weekly, while 97% used instant message services daily or weekly. Instant messaging is clearly a popular web-based communication tool worth investigation.

Table 4.6 Messaging and chat

	Very often	Often	Sometimes	Occasionally	Few	Never
Sent or responded to an email	6.3%	31.7%	52.4%	7.9%	1.6%	0%
Used an instant message service	22.2%	50.8%	23.8%	3.2%	0%	0%

\*very often (more than once a day)    often (daily)    sometimes (once or twice a week) occasionally (once or twice a month)    few (less than once a month)    Never (never)

#### *4.6.1.4.3 Social networking sites, wikis, blogs and web 2.0*

A number of enlightening results can be seen with regard to students' use of web 2.0 technologies. A significant social networking culture was evident among university students in China, given that all of the students (100%) joined social networking sites and 95% of students viewed or posted messages on such sites daily or weekly. While social networking software has recently been in the media headlines in Western countries, more attention is needed for the Chinese context. Wikis on the other hand, were less frequently used by student with 40% indicating they had not contributed to this type of web-publishing tool before and 24% had never accessed a wiki at all. Since the use of social networking tools was so predominant in the pilot, it was decided that social networking deserved a section of its own in the questionnaire for the main study.

Second to social networking, blogging seemed to be the second most popular web 2.0 technologies among university students in China. 94% of the students maintained their own blogs online and only 2% had not read a blog before. More than half of the students (65%) read blogs daily or weekly, while 51% maintained their own blogs daily or weekly. Moreover, interestingly, similar proportions of students maintained their own blogs (94) and contributed to others' blogs (92%).

Only a small number of students engaged with the more novel technologies (e.g. social bookmarking software such as delicious and micro-blogging software such as Twitter). Only 27% of students engaged in social bookmarking daily or weekly, while 44% had never used it before. The use of micro-blogging software was even less frequent: only 11% used it daily or weekly, while 60% of the participants had never used it before.

Table 4.7 Social networking sites, Wikis, Blogs, and Web 2.0

	Very often	Often	Sometimes	Occasionally	Few	Never
Looked at messages or posting on a social networking site	10%	38%	37%	3%	2%	0%
Sent a message through a social networking site	10%	37%	30%	16%	6%	2%
Used a wiki (e.g. Wikipedia)	2%	6%	25%	21%	22%	24%
Edited a wiki	3%	8%	22%	16%	11%	40%
Read a blog	6%	18%	41%	25%	8%	2%
Maintained own blog or website	3%	11%	37%	27%	16%	6%
Contributed to another's blog	6%	10%	44%	21%	11%	8%
Used a social bookmarking service (e.g. Delicious, Furl)	5%	11%	11%	5%	24%	44%
Used micro-blogging (e.g. Twitter, Fanfou, TaoTao)	0%	2%	10%	5%	24%	60%

\*very often (more than once a day)    often (daily)    sometimes (once or twice a week)    occasionally (once or twice a month)    few (less than once a month)    Never (never)

#### 4.6.1.4.4 Mobile phones

The majority of students relied heavily on their mobile phones to call and text people, with 91% of students texting daily. The newer features of mobile phones such as taking and sending pictures, access web-based information and sending, receiving emails were not included in the pilot questionnaire, but it was decided to include questions on these technologies in the main study.

Table 4.8 Mobile Phones

	Very often	Often	Sometimes	Occasionally	Few	Never
Made calls using a mobile phone	10%	16%	22%	8%	25%	19%
Sent text messages using a mobile phone	35%	35%	21%	10%	0%	0%

\*very often (more than once a day)    often (daily)    sometimes (once or twice a week) occasionally (once or twice a month)    few (less than once a month)    Never (never)

#### 4.6.1.4.5 Games

Students were also asked to rate how often they played games, both online and without an Internet connection. The results show that games were far less popular than email, messages, web 2.0 technologies, or other general use of computers. Nearly half of the students surveyed had never played online games before, and the majority of the rest (30%) played less than once a month. Computer, console or mobile phone games which did not require an Internet connection were a little more popular than online games. 67% of students had played these before and 27% played them daily or weekly.

Table 4.9 Games

	Very often	Often	Sometimes	Occasionally	Few	Never
Play games online	0%	2%	11%	6%	30%	51%
Played computer, console or mobile phone games that don't require you to be connected to a network	2%	10%	16%	14%	25%	33%

\*very often (more than once a day)    often (daily)    sometimes (once or twice a week) occasionally (once or twice a month)    few (less than once a month)    Never (never)

4.6.1.4.6 Computer software

Table 4.10 shows that most students relied on computers for creating digital documents and searching for information. A large majority of students (97%) used word processing programme daily or weekly, and while students did not create spreadsheets very frequently, they were clearly familiar with this activity (98% had used them before). Given that search engine companies like Google and Baidu are expanding their impact on the world, it is perhaps not surprising to find that search engine has become an indispensable part of students' digital experience. None of the participants had never used a search engine before, and almost three quarter of the students (73%) used one at least daily. Buying or selling things on the Internet was a less popular activity among students, but, still, 27% purchased or sold things on the web daily or weekly, with only 21% who had never done this before.

Table 4.10 Computer Software

	Very often	Often	Sometimes	Occasionally	Few	Never
Used a word processing programme (e.g. Word)	13%	43%	41%	3%	0%	0%
Used a spreadsheet programme (e.g. Excel)	2%	3%	21%	44%	29%	2%
Used a presentation software (e.g. PowerPoint)	0%	11%	52%	32%	5%	0%
Used a search engine to search the web	40%	33%	21%	5%	2%	0%
Purchased or sold things on the web	2%	3%	22%	33%	19%	21%

\*very often (more than once a day)    often (daily)    sometimes (once or twice a week)    occasionally (once or twice a month)    few (less than once a month)    Never (never)

#### *4.6.1.4.7 University life*

The final area of interest in this section asked students how often they used technology based tools related to their university studies. Of the activities being surveyed, using the web to look up references for study purposes was the most popular activity among university students, with 94% doing so daily or weekly. Students' access to online general course information (e.g. notices, timetables) was slightly less frequent than accessing course materials online (e.g. lecture notes, slides, podcasts, etc). While 67% of students accessed general course information daily or weekly, 53% of students' accessed course materials online daily or weekly. As the computer and the Internet become familiar technology for students, it was interesting to find out that most of the time that students' spent on the computer involved accessing the web. The university's online library resources were used fairly often by the students: 43% accessed the catalogue weekly, 19% rarely used it and only 3% did not use it at all (3%).

Compared with the massive use of email and messaging, communication between students through the university's online services was relatively low: less than half of the sample (41%) used the service daily or weekly. Perhaps because the students came from the Department of Social Sciences, nearly half of the students (49%) had never used discipline-specific technologies before.



Table 4.11 University life

	Very often	Often	Sometimes	Occasionally	Few	Never
Accessed materials relating to your course online (e.g. lecture notes, slides, podcasts, etc)	5%	8%	41%	38%	6%	2%
Accessed general information relating to your course online (e.g. notices, timetables)	3%	10%	54%	25%	6%	2%
Use a computer for general study, without accessing the web	8%	11%	16%	52%	13%	0%
Use the web to look up reference information for study purposes	8%	19%	67%	6%	0%	0%
Accessed/ used university's online library resources	3%	8%	43%	24%	19%	3%
Communicated with other students using university online services (e.g. email, forums)	2%	6%	33%	21%	32%	6%
Used discipline-specific technologies (Mathmatica, Matlab, AutoCAD, Stella etc.)	0%	5%	5%	18%	24%	49%

\*very often (more than once a day)    often (daily)    sometimes (once or twice a week)    occasionally (once or twice a month)    few (less than once a month)    Never (never)

#### ***4.6.1.5 Using technology to assist with university studies***

The next question in the survey presented students with a list of technology based tools that could be used in their university studies. Students were asked to use a rating scale (from 'extremely useful' to 'I don't know') to indicate the extent to which they perceive these tools to be useful to assist with their university studies.

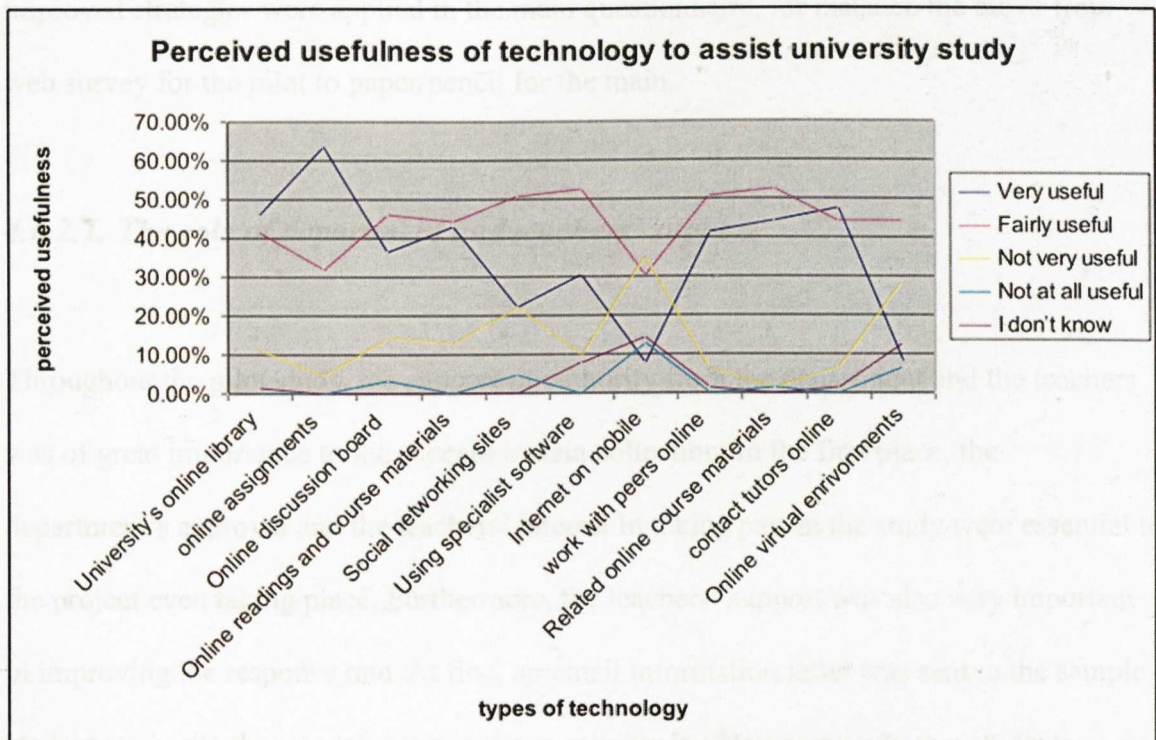
As can be seen from Figure 4.2, there are three general patterns of responses. First, there are technologies which the vast majority of students found useful (over 80%) to assist with their university studies and which, conversely, few students indicated that they did not find useful. The technologies in this category included submitting assignments online (95%), online collaboration with peers (92%), accessing course-related materials online (97%), contacting lecturers online (92%), the university's online library resources and catalogues (87%), the online discussion board (83%), specialist software supplied by the university (83%), and online reading (87%). Among these, submitting assignments online was what students' found most useful, with 64% of students ranking it 'very useful'.

The second pattern of results reflects technologies and tools for which there was slightly more divergence in students' responses. For these technologies, a large proportion of students indicated that they perceive them to be useful to assist with their university study, but a similar proportion held the opposite opinion. For example, 52% of students found visiting online virtual worlds useful for their study, while 35% found it useless. Half of the students (51%) found online social networking sites fairly useful, with a similar number of students (each 22%) finding them either very useful or not so useful.

Finally, the third pattern of results illustrates a clear drop in the number of students who found the technology useful, with a sharp increase in the number of students who found it useless. The technology in this category was using the Internet on mobile phones: only 38% found it helpful to their study, while 14% had not used it before.

However, reflecting on the results from this section, it was decided to include more technology based tools in the main study (for example, using instant messaging and chat, blogs and MP3/podcasts).

**Figure 4.2 Perceived usefulness of technology to assist university study**



Although it would have been interesting to explore the possibility of gender differences in students' use of technology to assist with their university life, again statistical analyses could not be carried out because of the small number of male students in the sample.

#### 4.6.2 Implications of the pilot study

The pilot study showed that the overall design of the questionnaire was feasible and helpful in answering the research questions. It gave me an excellent opportunity to try out the instrument and improve on the data collection strategies for the main study. It provided me with practical experiences of conducting educational research with Chinese university students. Furthermore, it also generated interesting preliminary results and identified new problems which could be further explored in the main study. During the pilot study, some good practice was discovered and maintained for the main study. For example, gaining support from the department and the teachers had a markedly positive impact on the

students' participation rates. Meanwhile, lessons were also learnt from the pilot study and improved strategies were applied in the main questionnaire, for instance the move from web survey for the pilot to paper/pencil for the main.

#### ***4.6.2.1. The role of department and teachers' support***

Throughout the pilot study, the support of authority from the department and the teachers was of great importance to the success in data collection. In the first place, the department's approval and the teachers' interest in taking part in the study were essential to the project even taking place. Furthermore, the teachers' support was also very important in improving the response rate. At first, an email information letter was sent to the sample students to invite them to take part in the questionnaire. However, only two students replied to my email and completed the online questionnaire. Later on, four teachers in charge of each class were asked to help by distributing the information letters in class on my behalf; as a result, sixty three students replied and completed the questionnaire online. This yielded an increase of response rate from 1% to 32.7%.

#### ***4.6.2.2 Distribution Channel***

There are many ways of distributing questionnaires, including distributing in person, via mail or over the Internet. Due to the geographical distance, the pilot study was conducted remotely. All the initial contacts and arrangements with the university about the pilot study were made via telephone and email. However, in the main study, I was physically present in the classroom and distributed the questionnaires in person. The reasons for this are twofold. Firstly, distributing the questionnaires to a group of people who can complete the instrument at the same time could maximize the response rates (Polit and Beck, 2008).

Secondly, my presence in the classroom would allow me to clarify any possible misunderstandings.

#### ***4.6.2.3 Online verse paper questionnaires***

An online questionnaire was adopted in the pilot study due to the geographical distance. The pilot study was administered remotely in the United Kingdom to student participants in China. Administering questionnaires online has many potential advantages over the use of traditional pen-and-paper administration, including being easier for me to administer and for the participants to complete, being easier to transcribe and eliminating data entry errors that occur with the transcription of paper questionnaires (Kongsved *et al.* 2008; Coles *et al.* 2007). However, it also has disadvantages and limitations in comparison with traditional pen-and paper-questionnaires, as was found in the pilot study. Firstly, there was a limitation in layout and format. The survey layout online was restricted to the template provided by the service provider. A second factor was the stability of the server. During the pilot, there were cases when the participants reported having problems with access to the web link. In fact, the link was not working for three hours due to server maintenance. Taking into consideration all above the factors, a pen-and-paper questionnaire was implemented in the main study.

#### ***4.6.2.4 Length of the questionnaire***

Much research has been done in an attempt to understand the factors that affect questionnaire participation rates, including introductions, postage, follow-up procedures, incentives, sponsor etc (Fox, Crask and Kim, 1988; Yu and Cooper, 1983). One prominent feature that is often assumed to affect the participation rate is the length of questionnaires (Berdie, 1973). Though common sense suggests that, the shorter the questionnaire, the

higher will be the response rate, there is little sound empirical work to guide the survey practitioner in decisions about survey length (Bogen, 1996).

The online questionnaire comprised 79 questions in four sections. Due to the restriction in format from the university's questionnaire service provider, the layout of the questionnaire was revised and adapted to the online template. The online template would only allow formats with plain singular/multiple choice questions, and text boxes. This made the questionnaires appear lengthier than the original layout, where sub questions of the same kind were grouped under one big question. However, the lengthy questionnaire did not appear to be a problem in participation rate in the pilot study. The student participants did not report any difficulties in filling in a questionnaire of such length. Also all the participants who completed the questionnaire answered every question. This suggested that the length of the questionnaire was comfortable for the student participants. Thus, the amount of information the survey asked was not reduced specifically in the main study, although the number of pages was reduced by restoring the original layout for a paper survey.

#### ***4.7 Data analysis***

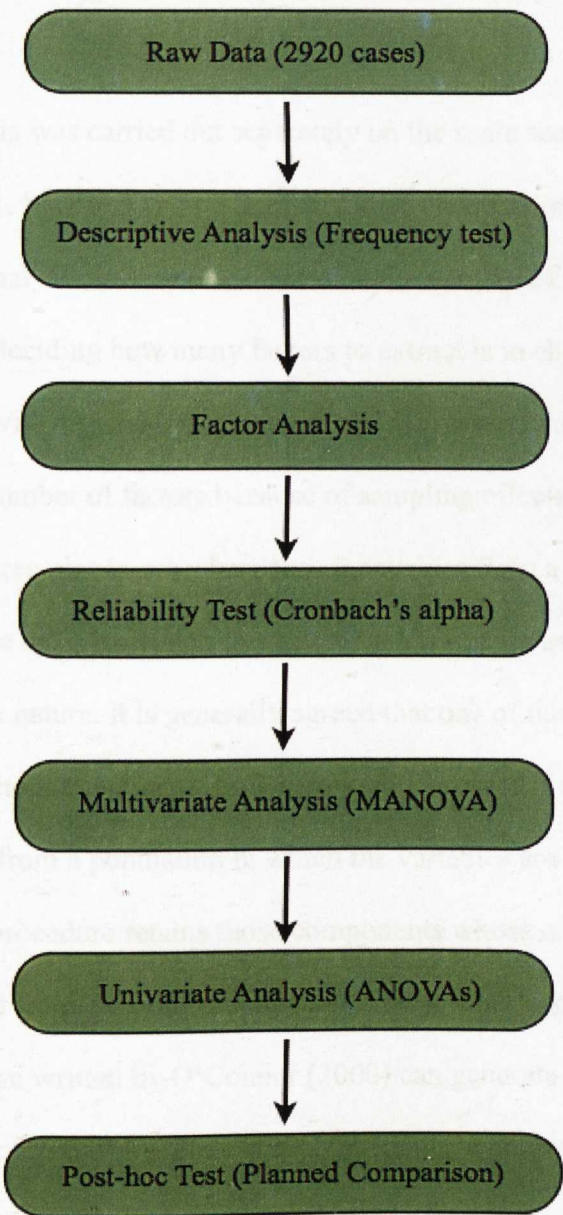
Both quantitative and qualitative data were collected from the data collection tools described above. Of the six typologies of mixed methods data analysis techniques proposed by Greene (2007), parallel mixed-data analysis (e.g. Creswell & Plano Clark, 2007; Greene, 2007) was adopted for this study. The quantitative and qualitative data were analyzed separately, after which inferences obtained from both strands were integrated to form meta-inferences at the end of the study.



4.7.1 Quantitative data analysis

2920 cases with 179 variables for each case were first coded and entered into SPSS version 17. Data screening was then used to examine scores for each variable so that anomalies could be addressed before the analysis began. The process of quantitative data analysis began with univariate description of all the variables. The overall sequence of data analysis is shown in the flowchart below.

*Figure 4.3 Steps for data analysis*



Descriptive statistics such as frequency and means were carried out to understand basic characteristics of the participants. In the meantime, anomalies due to data entry errors were corrected.

The next step of quantitative data analysis began with factor analyses to identify common underlying dimensions (factors/ key concepts) in the questionnaire. Variables were grouped into a manageable number of factors which were then analyzed and aggregated to determine a factor score. Multivariate analyses of variance were then carried out to test the relationship between constructs or variables obtained from the factor scores, as proposed in the research questions.

An initial factor analysis was carried out separately on the scale scores in Section B4, Section C1, Section D1, Section D5, and Section D6 of the questionnaire. Firstly, a principal component analysis was used to determine the number of factors to extract. The most common way of deciding how many factors to extract is to choose the number of principal components with eigenvalues greater than 1. However, this rule is known to overestimate the true number of factors because of sampling effects (Cliff, 1988). Another way is to inspect the scree plot to see where the eigenvalues form a smooth function representing error in the data. However, this rule which is known as the scree test is inherently subjective in nature. It is generally agreed that one of the most accurate ways of deciding how many factors to extract is to compare the observed eigenvalues with those produced by sampling from a population in which the variables are not correlated with each other at all. This procedure retains those components whose eigenvalues are greater than would be expected from a random correlation matrix. This is known as parallel analysis and the program written by O'Connor (2000) can generate expected eigenvalues for any number of samples. In the present study, O'Connor's program was used to identify the expected eigenvalues for 1000 random correlation matrices. For each analysis, a scree



plot is shown: the filled circles connected by a solid line represent the observed eigenvalues and the open circles connected by open circles represent the expected eigenvalues.

Principal axis factoring was then used to extract the relevant number of factors, using squared multiple correlations as initial communality estimates and using oblique rotation following a direct oblimin procedure. Loadings greater than .40 in absolute magnitude were regarded as salient for the purpose of interpretation, and the factors were labelled on the basis of items with the highest loadings. Following Pedhazur and Schmelkin (1991, p.625-650), factor-based scales were constructed by computing the respondents' mean scores on the salient items in each of the factors.

A second-order factor analysis was then carried out on these first-order factor-based scales to explore the broader dimension of students' use of technology measured in the questionnaire, using the same procedures as for the first-order factor analysis. Three factors were extracted from the second-order factor analysis, and it was clear that the factors reflected access to technology, attitudes to technology and skill levels with technology, respectively. Again, second-order factor-based scales were constructed by computing the mean scores on the salient items in each of the factors. Finally, a third-order factor analysis was carried out on the second-order factor-based scales in order to gain a global dimension of what was being measured in the questionnaire.

Following the factor analysis, a reliability test for multi-item scales was carried out on both the 19 first order scales and 3 second order scales, using Cronbach's (1951) coefficient alpha.

Multivariate analyses of variance (MANOVA) were then carried out to explore whether

students' use of ICT differed as they vary in age, disciplines, year of study, and gender. An initial MANOVA examined age as covariates, and discipline, year of study and gender as independent variables, and access to ICT, attitude to ICT and skill levels with ICT as dependent variables. Wilks'  $\Lambda$  (Lambda) were used to find out whether there were statistically difference groups on the combined dependent variables (age, gender, year of study, gender, discipline by year of study, discipline by gender, year of study by gender, and discipline by year of study by gender), as it measures the complement of the amount of variance shared between the scores obtained by the same group of participants on two sets of variables (Richardson, 2007). Follow-up univariate tests were then carried out to explore the origins of these effects; meanwhile mean scores were calculated to show how the students differed on each of the effects.

A subsequent MANOVA was conducted on the 19 first-order subscales to further examine whether students differed in specific aspects of access, attitude and skill levels with ICT as they vary in age, disciplines, year of study and gender. A MANOVA was performed on 19 dependent variables: access to blogging, access to interactive technologies, access to learning, access to social networking, skill levels with office, skill levels with interactive technologies, access to digital photography, attitude to usefulness, attitude to learning, positive attitude, negative attitude, skill levels with social networking, skill levels with learning, skill levels with office, skill levels with mobile phones, access to mobile phones, ambivalence attitude, and attitude to gaming. Independent variables were discipline, year of study and gender, with age as covariates. Again, follow-up univariate tests were carried out to identify where the significant difference lies, and mean scores were calculated to show how students differed on each of the effects. Furthermore, specific post-hoc tests were conducted on the interaction of discipline and year of study, interaction of discipline and gender, and interaction of discipline, year of study and gender to find out where any differences arose.

Because of the large number of statistical tests that were carried out, a threshold probability level (alpha level) of 0.01 was used to avoid spuriously significant results (Type I errors). Because of the large sample size, the results might be statistically significant but of little theoretical or practical importance. Partial eta squared was therefore used as a measure of effect size. This measures the proportion of variance associated with a particular variable when the effects of other variables and interactions are statistically controlled (Bakeman, 2006; Cohen, 1973; Levine & Hullett, 2002; Olejnik & Algina, 2000). Cohen (1988, pp. 285-287) suggested that proportions of explained variation of 0.0099, 0.0588 and 0.1379 would constitute small, medium and large effects, respectively.

There are two forms of eta squared noted in the literature, classical eta squared and partial eta squared (Cohen, 1973, 1988; Fisher, 1973; Kepel, 1982; Pearson, 1911). Classical eta-squared is 'the proportion of total variance attributable to the factor' (Pierce *et al.* 2004 p. 918). In comparison, partial eta-squared describes the 'proportion of total variation attributable to the factor, partialling out (excluding) other factors from the total nonerror variation' (Pierce *et al.* 2004 p. 918). Both classical and partial eta-squared range in value from 0 to 1. However, these values are often inaccurately reported (Olejnik and Algina, 2000; Pierce *et al.* 2004). As Levine and Hullett (2002) noted, this may be attributable to the fact that the common statistical software programme SPSS (prior to version 11.0) mislabelled partial eta squared as eta squared in its output files.

A number of researchers have addressed the distinction between classical and partial eta squared as measures of strength of association, and recommended the use of eta squared as a measure of strength of association. Some (e.g. Levine and Hullett, 2002) advocated only the use of eta squared and some (e.g. Bakeman, 2006) advocated only the use of partial eta squared, while others (Olejnik and Algina, 2000; Pierce *et al.* 2004) argued that either eta

square or partial eta square could be useful as long as the results are reported accurately and explicitly, with recognition of the inherent limitations associated with the indices of effect. For the purpose of this study, partial eta squared (Cohen, 1973) was chosen as the measure of effect size in this thesis. Richardson (2011) explained that Cohen's criterion on values of eta-squared can also be applied to values of partial eta-squared obtained from multi-way analyses of variance, where the effects of other independent variables and the interaction within the variables are partialled out before computing the proportion of variance explained.

Meanwhile, it is worth noting that these measures of effect are not without their critics. Feldt (1973) for example, found that for the Iowa Test of Basic Skills, a 'large' effect is considerably smaller than that suggested by Cohen. Cohen recognized this limitation and encouraged other researchers to provide alternative standards, though as yet, none have been agreed. As a consequence, Cohen's (1988) recommendation on proportions of variation was used as a standard criterion in this study.

#### 4.7.2 Qualitative data analysis

The qualitative data in this study mainly came from 13 group interviews with 29 students, which attempted to draw out the learners' voices in order to capture the variety of students' perspectives and experiences of using ICT both at home and at university. Thematic analysis was used as a data analysis tool for the qualitative data. The methods were shaped by the need to stay open to the experience of the participants in describing the developments of their individual experience. It followed fairly closely the model outlined by Braun & Clarke (2006), which involves a constant reading of the data set to familiarise myself with the data, generating initial codes, searching for themes (repeated patterns of meaning and issues of potential interest), reviewing themes, defining and naming themes

and relating the analysis back to the research questions and literature.

The qualitative interview analysis proceeded in two phases. In the first phase, the core work was to prepare transcripts and code the interviews. The interview questions were designed to align with the research questions; hence the questions were used as the basis for coding. The interview data was firstly transcribed and manipulated in Word, followed by a general summary of each group interview to see if some general patterns emerged. Repeated listening to the data and was important in capturing the participants' perspectives and interpreting their voices. It was also through the actual work of transcription and re-transcription that the recurring patterns through which the students made sense of experience and constructed their accounts were recognized. The patterns of data were identified by counting the number of times a particular event occurs. This helped to identify the significance of each pattern. It was also used as a tool for self-reflection and to guard against biased reporting of evidence, as recommended by Nisbet and Watt (1980) that doing qualitative research with the aid of numbers leads to a check on how robust the researcher's insights are. Research shows that qualitative researchers can habitually overemphasize facts that they believe in and dismiss those that they do not (Nisbet and Watt, 1982). Thus, the themes grow from counting as recurring patterns are noted in the interviews and related back to the students' responses.

In the second phase, group interviews were analyzed individually, followed by an overarching analysis across the interviews. In doing so, I sought to answer the research questions in ways that permitted broader theoretical conclusions. At this point the analytical categories and structure to be used in this thesis had been tested against the data and had become largely established. After that, the data was categorized and colour-coded according to the emerging patterns. The results were then interpreted and compared with previous studies. At the same time, relevant extracts from the interviews were quoted and

used to provide more in-depth information about students' perceptions and how technologies impacted on their learning. Note that, for the purpose of illustration, only one quotation was used to represent a theme even when several participants expressed the same thought.

Though there are different levels of precision in a transcript, such as filter words, pause, laughter or physical gestures of emphasis or puzzlement, for the purpose of this study, only a few filter words such as 'uhmms' and 'ah' were put in to indicate the flavour. Rather than marking the length of a pause, a note was put in brackets, such as '[Interviewee points to his partner]'. The idea was to put into the transcript only the level of detail to be analyzed and to include information that might contribute to the interpretation of the results (Rubin and Rubin, 2005).

During coding, more important than borrowing concepts from the published literature was to find themes emerging from the interviews. The process began by looking at explicit terms used in the interview questions and include those relevant on the coding list. For example, one of the questions asked what students do with mobile phones. The concept 'mobile phones' certainly became one of the codes. Besides, concepts or themes that were frequently mentioned by interviewees were also coded. For example, many of the interviewee explicitly raised the issue of changing mobile SIM cards. They think this is important, and it is cheap for them to change SIM cards every month, so 'change of SIM cards' was also included as a coding category. Apart from terms explicitly raised, concepts/themes indirectly revealed during the interview, and concepts/themes emerged from comparing interviews were also included in the coding category. For example, during the interviews, some of the students expressed a sense of social preconception regarding young people's use of Internet, and this influenced their attitude and behaviour towards computers to some extent. Thus 'preconception regarding young people's use of Internet'

was coded as a category. Last, concepts and themes already identified could also suggest new, related themes.

## ***4.8 Validity, reliability and ethical issues***

### **4.8.1 Validity and reliability**

Both validity and reliability are important for the design of the study and interpretation of the data collected. Validity is concerned with the appropriateness, correctness and accurateness of the inferences made by the researcher whereas reliability refers to the consistency of the measurements, namely whether the same results can be obtained if it was done at a different time by another researcher (Gay & Airasian, 2003). The pilot study in University B validated the instruments. Selected students also pre-tested the interview questions and evaluated the instruments used in this study. Besides, the research design was evaluated and revised accordingly after each step to refine the whole research process.

Validity and reliability are essential considerations when designing and carrying out the research (Bloor, 1978; Lincoln & Guba, 1985). In implementing the study, different data collection methods were used to minimize the potential effect of researcher bias.

According to Denzin (1970), there are many varieties of triangulation, including time triangulation, space triangulation, combined levels triangulation, theoretical triangulation, investigator triangulation and methodological triangulation which is further divided into within methods triangulation and between methods triangulation. The ‘between methods’ triangulation was manifested in this study through the use of questionnaires and interviews to collect data. At the same time, during the interviews, there was a ‘within methods’ triangulation: the combination of voice recording techniques and note-taking.

In order to achieve reliability and validity of the quantitative survey, the survey was submitted back-and-forth to my supervising team for feedback and revision during the development. The team suggested re-ordering the applications/devices and removing questions relating to the use of webcam and online shopping. The team also suggested reducing some of the 6-point response scales into a 5-point scale by rewording the degree of frequency. Before the final printing, specialists from the Open University's Student Survey Office also reviewed the questionnaire in an attempt to improve content validity as it related to the university student experience with technology. They had no suggestions that were implemented in the questionnaire. Finally, the questionnaire was reviewed a final time and approved by the Open University Human Participants and Materials ethics Committee (HPMEC) before a group of sixty-three students from University B piloted the questionnaire. Last, the validity of these instruments was supported by ideas from other researchers' questionnaires adopted from recent research projects and published studies (Kennedy *et al.* 2006; 2007; 2008; Jones *et al.* 2010; Jones & Cross, 2009; Jones & Ramanau, 2009a, 2009b). In the current study, the entire questionnaire on students' use of ICT has good internal consistency, with a Cronbach alpha coefficient of .979

The subjective nature of the qualitative interview data inherently contained bias, thus validity was considered as a matter of degree rather than an absolute state (Gronlund, 1981). Reliability mainly refers to the 'degree of accuracy' and the 'comprehensiveness of coverage' (Bogdan & Biklen, 1992: 48). Great care was taken in the design of the interview protocols and in the manner of carrying out the interviews. In order to achieve validity in interviews, efforts were made to minimize the amount of bias. There were mainly two sources of bias in the interviews: the content of the research questions and the characteristics of the interviewer and interviewees. Oppenheim (1992) noted that the 'wording' is particularly important in questions about attitudes. The wording of the



interview questions in this study was based on three criteria: simplicity, naturalness and objectivity. For example, the study investigated students' use of technologies in light of the concept of 'Net Generation', but the phrase 'Net Generation' was intentionally avoided. Instead it was replaced by statements like: 'what do you think of your peers?' In terms of the manner of conducting the interview, comfortable setting was chosen at a mutually agreed time. Throughout the interview, attention and interest was shown without any suggesting comment, agreements or disagreement with any of the interviewee's answers.

In addition to designing and conducting the research, validity and reliability were also controlled in the translating, transcribing and data analysis processes. The questionnaire was designed in English originally and translated into Chinese, which is the native language of the participants. In order to ensure the validity, the questionnaire was translated back into English and reviewed by third party researchers. In conducting in-depth interview research, I was immersed in the data collection and data analysis for months. With the intensive involvement, I might have developed a sense of what the data was about and it represented a good starting point for the final analysis. However, its subject nature inherits potential bias. Thus the interview analysis involved systematic coding and extracting information from the transcripts rather than looking for confirmation of my initial ideas. The transcript of each interview was clarified with the interviewee and the coded data was then checked by another researcher to enhance objectivity. The data analysis and interpretation process was carried out twice to minimize the chances of misinterpretation. As a further check on the validity of the interpretation of data, the results of the study were sent back to the students for validation.

#### 4.8.2 Ethical issues

The ethical nature of the research was ensured by basing procedures on the ethical code of

the Open University's Human Participants and Materials Ethical Committee

(<http://intranet.open.ac.uk/research/ethics>), drawing on advice by them, together with the

Open University's Data Protection Code of Practice

(<http://intranet.open.ac.uk/planning/dp/>).

Prior to the distribution of the questionnaire, an information letter including a short description of the project was given to the student participants. They were assured that their participation in this study was voluntary and that any information obtained from the participants would remain confidential and used only for the purpose of this research. Completion of the questionnaire was anonymous, and the students were also assured that they were free to withdraw their answers from the analysis. Return of the completed questionnaire implied consent to their participation.

As interviews were involved as part of the data collection, the main ethical considerations were ensuring the confidentiality of the responses made by the participants. As such, identifiers were removed as soon as possible in the data management process, and this applied to both paper and electronic records. All the participants will be referred to using pseudonyms in publications arising from the research, and the processing of data was governed by the Data Protection Act and complies with the University's Data Protection Code of Practice. While analyzing the qualitative data, a balance between protecting the rights of the individuals and perceiving the richness of the data was maintained. Also in small organizations, the context can often make the identification of participants quite easy. However, the confidentiality of information was viewed as an integral part of the obligation to respect their private lives. Anonymity was preserved at the same time as providing the necessary rich context.

## ***4.9 Summary***

This chapter has provided a detailed presentation of the methodological issues involved in the study. A mixed-methods approach was adopted in this study: both quantitative and qualitative data were collected to answer the research questions. The main empirical study was conducted during May-July 2010 with students from year one to three across eight disciplines at University A. Two thousand nine hundred and twenty students completed and returned the survey on their frequency of use, attitudes towards, and use of a range of technology based tools both in and outside the classroom. To follow up the survey, focus group interviews were conducted with twenty nine students. The computer software SPSS was used for the quantitative data analysis.

# Chapter 5 Quantitative Results

## 5.1 Introduction

As discussed in chapter 4, a survey was used to gather information about students' experiences with a selection of current technology and technological tools at university. The survey featured largely quantitative components, with scale-based questions being used to collect data intended to help answer the research questions. With a different focus from the qualitative interviews, the quantitative survey primarily answered research questions with regard to:

- 3 'Is there any variation in students' use of technologies across disciplines?'
- 4 'Is there any variation in students' use of technologies across years of study?' and
- 5 'Is there any gender difference in students' use of technologies?'

Whereas the quantitative data provided systematic but relatively superficial evidence relevant to the following research questions:

- 1 'How do university students in China use technologies for social and leisure purpose?' and
- 2 'How do university students in China use technologies to support their learning?'

The qualitative interviews provided in-depth evidence from a much smaller number of informants. It was intended that any conclusions drawn as a results of the quantitative analysis process could then be further explored through qualitative analysis with students that will be discussed in Chapter 6.

**Table 5.1 Research questions and data**

Research Questions	Primary Data	Secondary Data
1. How do university students in China use technologies for social and leisure purpose?	Qualitative interview analysis	Description analysis of quantitative (Section B and C of the survey)
2. How do university students in China use technologies to support their learning?	Qualitative interview analysis	Description analysis of quantitative survey (Section D of the survey)
3. Is there any variation in students' use of technologies across disciplines?	Quantitative factor analysis and MANOVA test	Qualitative interview analysis
4. Is there any variation in students' use of technologies across years of study?	Quantitative factor analysis and MANOVA test	Qualitative interview analysis
5. Is there any gender difference in students' use of technologies?	Quantitative factor analysis and MANOVA test	Qualitative interview analysis

Chapter 5 presents the results and analysis of the quantitative data collected from 2920 student surveys. Using a five-point scale, students indicated their access to and self-perceived skill levels, and attitudes towards a range of technology and technological based tools. In section 5.2, general information from the sample is outlined. In section 5.3, descriptive results on students' access to ICTs (Information and Communication Technology) are reported, followed by descriptive results on students' self-reported skill levels with ICTs in section 5.4. Additionally, factor analyses were performed to identify key themes of the questionnaire by reducing the number of variables and uncovering the patterns of data. The results of three levels of factor analyses are presented in section 5.5. Last, in section 5.6, multivariate analysis of variance was used to examine whether students' self-reported use of ICTs differed by discipline, year of study, gender and age, as identified in the research questions.

## 5.2 Description of sample

The survey was completed by a total of 2920 students across eight disciplines from three year levels on their experience with technologies, generating a response rate of 83%. Of all the respondents, 1717 (or 58.8%) were female and 1203 (or 41.2%) were male. It is worth mentioning that the university’s support and the teachers’ endeavor did help to increase the response rate, and also the fact that the questionnaire was distributed to students during the class contributed to a high response rate. Table 5.2 provides a breakdown of the respondent distribution.

Table 5.2 Distribution of sample by discipline and year (n=2920)

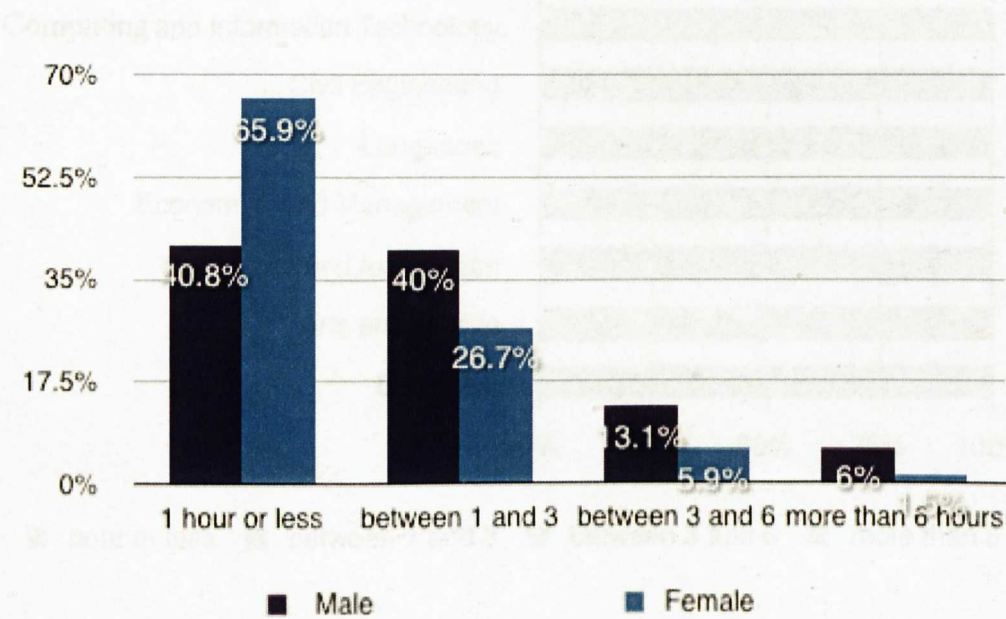
Programme of study	Year of study			Total
	First year	Second year	Third year	
Computer and Electronics Engineering	174	181	76	431
Civil Engineering	120	204	120	444
Languages	64	139	60	263
Economics and Management	187	150	136	473
Mechanics and Automation	113	249	101	453
Arts and Design	124	126	164	414
Education	186	149	107	442
Total	1058	1198	764	2920

Section B, question 1 asked students to indicate how many hours they normally spent on a computer each day: more than half (55.6%) of the students indicated that they spent an hour or less. About a third (32.2%) spent between one to three hours on a computer on a

daily basis. Less than a tenth (8.9%) spent between three to six hours and only a small number of students (3.4%) spent over six hours on a computer each day.

Gender-wise, men spent significantly longer on computers than women (as shown in Figure 5.1). This was further confirmed by a Mann-Whitney Test ( $U=749756$ ;  $z=-14.16$ ;  $p<.001$ ), which showed a highly significant difference between men's and women's daily average hours spent on computers. While nearly 70% of women spent less than an hour on computers everyday, more than 59.2 % male students spent more than an hour per day. Furthermore, one in five (19.1%) men spent at least three hours on computers everyday. To find out how they actually used computers in detail, qualitative interview results are presented in Chapter 6.

**Figure 5.1 Average hours spent on computers by gender**

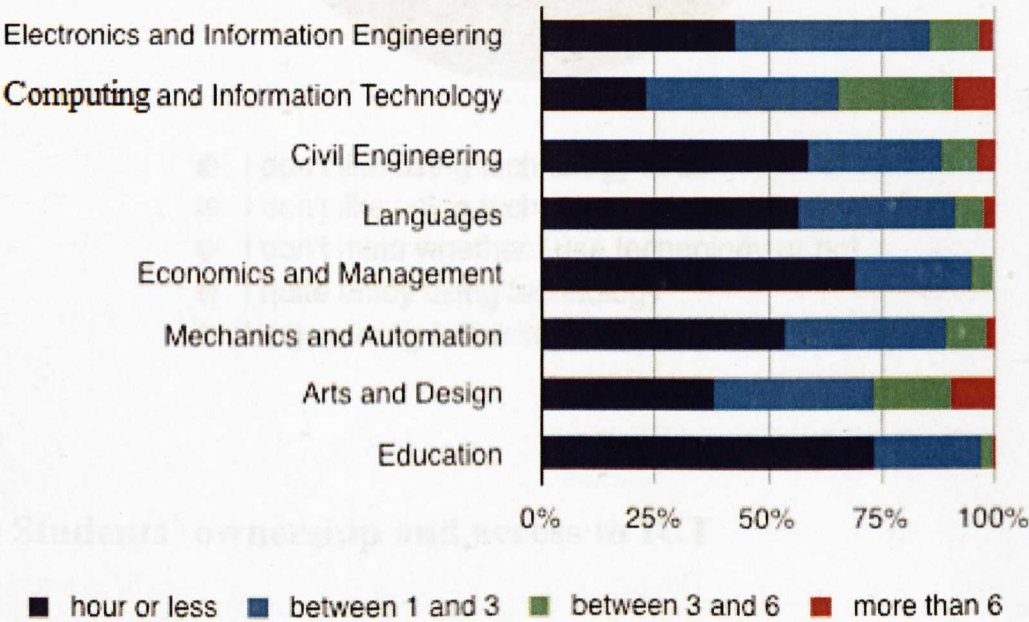


Across disciplines, students in two programmes tended to spend longer on computers than others, namely students in Computing and Information Technology, and Arts and Design (see Figure 5.2). A large number of students (42.6%) in Computing and Information



Technology spent on average between one to three hours on computers everyday. One fourth spent between three to six hours a day, and almost one in ten (9%) spent more than six hours a day. Similarly, students in Arts and Design also spent longer on computers than students in other departments. One third (38.2%) of them spent less than an hour, one third (35.3%) spent between one to three hours and another third (26.7) spend more than three hours a day. Among them, 9.7% spent more than 6 hours on computers everyday, whereas students in Economics and Management, and Education tended to spend the least time on computers amongst the disciplines being surveyed, with almost 75% of them spending less than an hour per day on a computer.

*Figure 5.2 Average hours spent on computers across disciplines*

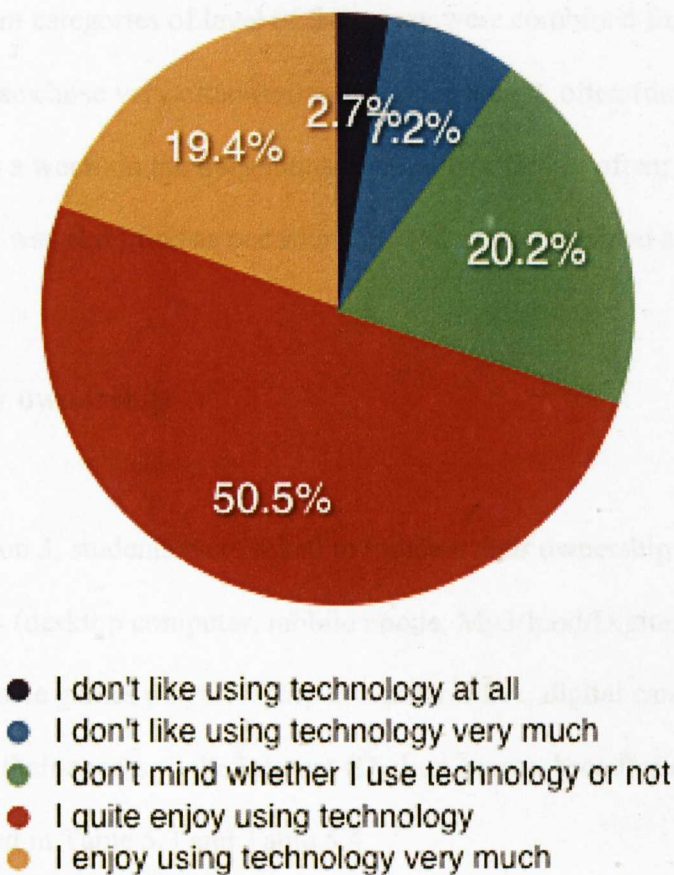


Section B, question 2 was intended to give an overview of students' attitudes towards the use of ICTs. In general, students expressed positive attitudes towards the use of computers and other digital technologies. About 70% of the participants indicated that they enjoyed



using them, while only less than 10% showed negative attitudes towards the use of technology. Figure 5.3 gives a graphical presentation of the percentage of responses.

**Figure 5.3 Attitude towards technology**



**5.3 Students’ ownership and access to ICT**

Section B, question 3 and 4 were intended to gather information on respondents’ access to ICTs and how frequently they used these various technologies and technology based tools at university. Question 3 asked students to indicate their ownership of a range of digital devices and network connections. Descriptive data are presented in section 5.3.1. In the following question, students were asked to rate, on a five-point scale (1= very often, 2=

often, 3=sometimes, 4=occasionally, and 5=never), how frequently they used a selection of technology based tools, ranging from audio, video and images; messaging and chat; social networking sites; wikis, blogs and web 2.0; mobile phones; games/entertainment; Microsoft Office programme; to learning programmes for university studies. The results and analysis of this part of the survey are presented in section 5.3.2. For the purpose of illustration, different categories of level of frequency were combined from the original questionnaire. Those chose very often (more than once a day), often (daily) and sometimes (two of three times a week) in the questionnaire was classified as often; occasionally (less than twice a week) was classified as occasionally; and never remained as never.

**5.3.1 Technology ownership**

In section B question 3, students were asked to indicate their ownership of a range of technology devices (desktop computer, mobile phone, Mp3/Ipod/Digital music player, usb memory stick, console games player, laptop computer, PDA, digital camera, handheld games player) and their access to the Internet (Dial up access, broadband, wireless). The results are presented in Table 5.3 and Table 5.4.

Table 5.3 shows that most commonly a moderate to low proportion of students had sole ownership of the devices I asked about. Mobile phones amongst all were the device most commonly owned by students. The majority (85.8%) of the students owned mobile phones. Following mobile phones, MP3 players and usb memory sticks were the second and third most accessible devices, with a ownership rate of 59% and 49.5%. Nevertheless only a small number of students had sole access to game consoles, handheld games players, PDAs or digital cameras. Despite the general claim of wide access to technologies, and despite the fact that these young people had been brought up immersed in a technology rich environment, sole ownership of desktop computers and laptops was very low. There was

also not much difference between ownership levels of desktop computers (19.7%) and laptop computers (19.3%). This was further explored in students' interviews, as illustrated later in Chapter 6.

These data on Chinese university students' ownership of computers provided a clear contrast with findings from the United Kingdom (Jones *et al.* 2010; Margarayan and Littlejohn, 2009), the United States (Salaway *et al.* 2008) and Australia (Kennedy *et al.* 2008). Whereas over three quarters of students own a laptop and over a third own a desktop in UK universities (Jones *et al.* 2010), less than one third of the student population being surveyed owned either a laptop or a desktop. However, whereas over two thirds of those asked in United Kingdom (Jones *et al.* 2010) felt that their access to computers was sufficient to meet their needs, the interviews in this study equally showed that most students felt their computer access mostly met their needs.

In terms of Internet connections (Table 5.4), a surprisingly low proportion of students had their own Internet connection. Comparing students' Internet access here with students from western countries, where 72.9% of the students' in Australian universities had unrestricted access to broadband (Kennedy *et al.* 2008), and 55.6% of UK university students had unrestricted access to broadband (Jones *et al.* 2010), only 12.8% of the students surveyed had a broadband connection. Unrestricted access to dial-up connection and wireless connection was even poorer, with only 6.4% and 7.4%, respectively.

Table 5.3 Students' technology ownership

	<b>Frequency</b>	<b>Missing</b>	<b>Valid percentage</b>
Desktop Computer	574	4	19.7%
Mobile Phone	2506	4	85.8%
Mp3/iPod/Digital Music Player	1724	4	59%
Usb Memory Stick	1444	4	49.5%
Console Games Player	128	4	4.4%
Laptop Computer	563	4	19.3%
PDA	120	4	4.1%
Digital Camera	390	4	13.4%
Handheld Game Player	167	4	5.7%

Table 5.4 Students' Internet access

	<b>Frequency</b>	<b>Missing</b>	<b>Valid percentage</b>
Dial-up Connection	187	4	6.4%
Broadband Connection	373	4	12.8%
Wireless Connection	213	4	7.4%

### 5.3.2 Students use of ICT

In Section B question 4, students were asked to rate how often they used particular tools to cope with their study and for leisure on a five-point scale. Table 5.5 summarizes the results with regard to students' responses on using tools for working with audio, video and images. The table shows the percentage of students who indicated that they used the technology in the way described (e.g. listening to an audio file or a podcast) with the specified frequency

of use (often, occasionally or never). The results suggested that use of images, audio and video application was pervasive among Chinese university students, with a large number often using a computer to listen to audio files, browsing photos on the web and watching online video. Only a small percentage of the participants had never done any of these before. Follow-up interviews showed that for many, listening to music or watching movies was one of the most common leisure activities in which students engage online. They enjoyed getting online to look for new movies, music or videos of their interests because, first, they had more choice online, secondly it was free, and thirdly they could choose to watch whenever and wherever they wanted. The most common activity was to download music or movie from the Internet and then watch it on their own MP3/4/5 player. There were also girls in the same dormitory who often went to the Internet café in a group to download movies. They downloaded the movies onto usb memory sticks and then transferred them onto a computer in the dormitory. Those who did not have an MP3/4/5 player downloaded the songs or movies onto a mobile memory card and listened to or watched them on their mobile phones.

Compared with browsing photos, listening to audio and watching video files, more sophisticated media manipulation such as uploading and editing media files was less common, though there were still a fair number of students who used these applications frequently. 65.6 % of the students had often uploaded photos onto the web and 55.7 % had edited a digital photo on a computer. 47.8 % of the participants had often uploaded audio onto the web and slightly fewer (44.7 %) had often edited audio on the computer. 43.2 % had often uploaded video onto the web and 34.1% had edited video on a computer. While a fair number of participants often uploaded and edited audio and video media files, there were also quite a few who had never done this before. For instance, about a quarter of the respondents had never uploaded any audio onto the Internet, one third had never edited audio file on a computer. Other than that, about a third of the participants had never

uploaded video onto the Internet and two fifths had never edited video on a computer. From interviews with the students, it seemed that the primary reason for this was because there was no need for them to do it, nor were they interested in doing it. As one participant said in an interview, ‘I haven’t updated any videos online, and I don’t think that’s something interesting, I just don’t need it, and rarely go to sites like that.’

Furthermore, in terms of uploading images or audio and video files onto the web, uploading photos was done the most frequently, followed by uploading audio and video. In terms of editing, the same descending sequence by frequency applied: editing photos, then audio and then video.

Table 5.5 Use of audio, video and images

	Often	Occasionall y	Never
Listened to an audio file (e.g. MP3) or a podcast	80.1	14.1	5.8
Uploaded audio to the web	47.8	28.3	23.8
Edited digital audio on the computer	44.7	25.2	30.0
Browse photos on the web	78.5	18.3	3.3
Uploaded photo to the web	65.6	26.3	8.1
Edited a digital photo	55.7	29.4	14.9
Watched video online	77.4	17.9	4.7
Uploaded video to the web	43.2	25.4	31.5
Edited video on a computer	34.1	24.3	41.6

**Figure 5.4 Use of audio, video and images**

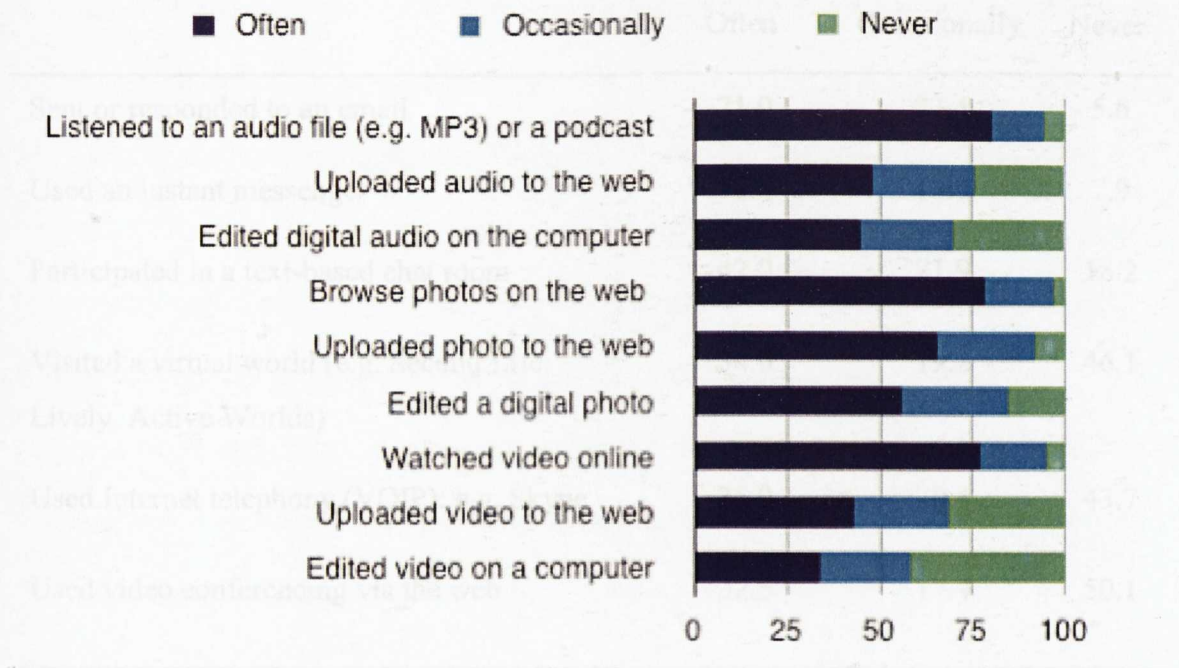


Table 5.6 summarizes the responses to the questions relating to students' use of messaging and chat programmes. The results show that the most frequently used application for messaging and chatting was an instant messenger. Over 78 % of the participants reported that they often used an instant messenger, at least twice a week, whereas less than 10% had never used one before. Their use of emails was less frequent though still quite common, with 71 % reporting the frequent use of emails, and only 5.6 % had never used it before. However, the students' use of more sophisticated audio-visual communication applications, such as voice over IP, video conferencing and virtual worlds was much less frequent: almost half of the student participants had never used these programmes before.



Table 5.6 Use of messaging and chat

	Often	Occasionally	Never
Sent or responded to an email	71.0	23.4	5.6
Used an instant messenger	78.6	13.5	7.9
Participated in a text-based chat room	42.0	21.9	18.2
Visited a virtual world (e.g. Second Life, Lively, Active Worlds)	34.6	19.2	46.1
Used Internet telephony (VOIP): e.g. Skype	35.9	20.4	43.7
Used video conferencing via the web	32.5	17.4	50.1

Figure 5.5 Use of messaging and chat

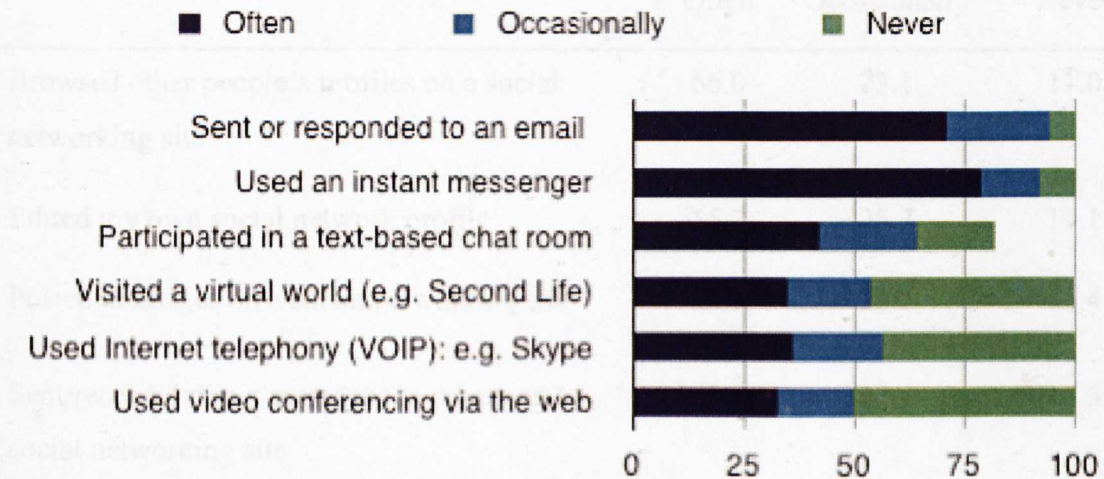


Table 5.7 summarizes the responses relating to social networking technologies (e.g. Facebook, Xiaonei, Kaixin, Myspace). In contrast to Australia (Kennedy *et al.* 2008) and the United Kingdom (Margaryan and Littlejohn, 2008), where students make limited use of social networking sites, a significant social networking culture was evident among university students in China. As in the United States, where 82% of university students were registered with one or more social networking sites (Salaway *et al.* 2008), only about



10% of the students had never used a social networking site before. With regard to what they did on social networking sites, the most frequent activities include, in descending order, browsing other people’s profiles, sharing files such as articles, photos or video clips, and sending and receiving messages. Compared with taking information from social networking sites (SNS), contributing to a social networking site (for instance, by editing their own profiles, posting messages or commenting) was slightly less frequent, though still quite common. More than half of the participants did this at least twice a week. With regard to extra applications on social networking sites (sending/receiving gifts, little games and quizzes), they were getting more and more popular. About half of the respondents used these frequently, and only one fifth of them had never used them before.

Table 5.7 Use of social networking sites

	Often	Occasionally	Never
Browsed other people’s profiles on a social networking site	66.0	23.1	11.0
Edited my own social network profile	55.2	25.7	19.1
Posted messages on a social networking site	55.3	28.3	16.4
Sent/received direct messages to others on a social networking site	60.1	23.4	16.5
Share files on a social networking site (e.g. article, photo, video)	61.8	25.6	12.7
Comment on other’s shared files	56.3	29.7	13.9
Used the extra applications on a social networking site (e.g. gifts, constellation, fluffy friend, quizzes)	47.6	31.9	20.5

Figure 5.6 Use of social networking sites

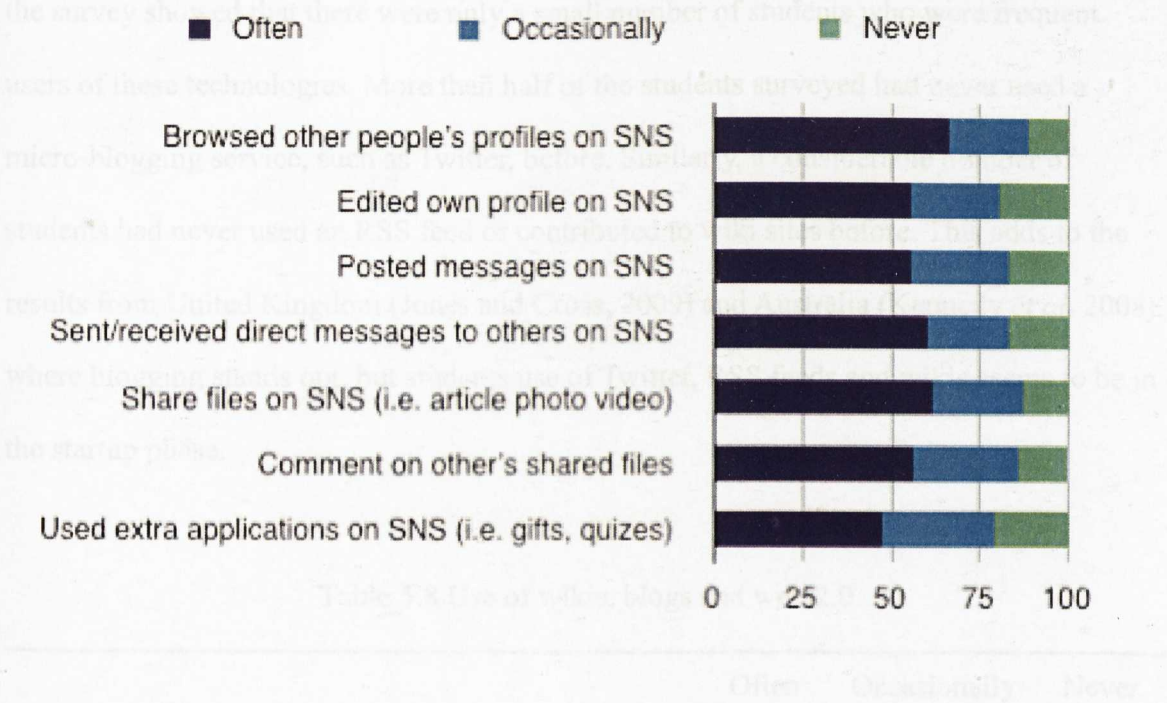


Table 5.8 summarizes the responses to questions relating to wikis, blogging and other web 2.0 technologies. In contrast to results from the United Kingdom where students make limited use of blogs (Margaryan and Littlejohn, 2008; Jones and Cross, 2009), there was a large number of students who were frequent users of blogs in China. Comparing results from Australia (Kennedy *et al.* 2008), where only a third (34.9%) have kept their own blog, more than 70% of the participants had maintained their own blogs and a similar proportion of students contributed to others' blogs. Furthermore, there were others who would read others students' blogs even though they didn't keep their own: more than half of the respondents would do this on a weekly basis. However, more novel web 2.0 technologies, e.g. social bookmarking, RSS feeds and micro-blogging, were not as popular. Although more people were starting to use them, at the time of the research, not many participants had used them frequently.

Despite the growing media attention from the west and the predictions of commentators who suggest that many of the Net Generation were actively engaged in the process of

information and knowledge creation (Lorenzo, Oblinger & Dziuban, 2007), the results of the survey showed that there were only a small number of students who were frequent users of these technologies. More than half of the students surveyed had never used a micro-blogging service, such as Twitter, before. Similarly, a considerable number of students had never used an RSS feed or contributed to wiki sites before. This adds to the results from United Kingdom (Jones and Cross, 2009) and Australia (Kennedy *et al.* 2008), where blogging stands out, but students use of Twitter, RSS feeds and wikis seems to be in the startup phase.

Table 5.8 Use of wikis, blogs and web 2.0

	Often	Occasionally	Never
Check information on Wikipedia or other wiki sites	42.4	20.9	36.7
Edited Wikipedia or other wiki sites	37.6	20.3	42.1
Read a blog	52.1	28.3	19.6
Maintained own blog	45.3	25	29.7
Comment on other’s blog	45.6	27.2	27.2
Used a social bookmarking service (e.g. Delicious, Furl)	43.8	22	34.3
Used an RSS feed to provide you with a content	34.5	20.1	45.3
Used a file sharing service (e.g. Google Docs)	44.7	25.3	30.1
Used a micro-blogging service (e.g. Twitter, Fanfou,TaoTao)	31.2	18.0	50.8

**Figure 5.7 Use of wikis, blogs and web 2.0**

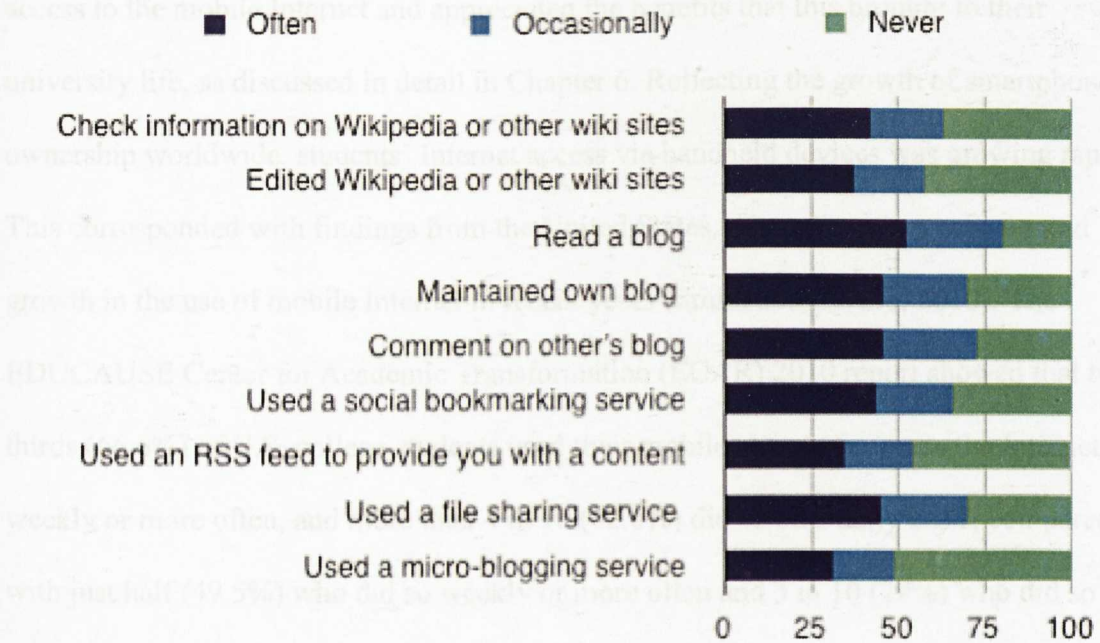


Table 5.9 summarizes the responses relating to students’ use of mobile phones. The results showed that the use of mobile phones was almost ubiquitous among the respondents. The majority of students made heavy use of their mobile phones to call or text people on a daily basis and more than half of the students did so more than once a day. This was further illustrated in the qualitative interview results, where students’ explicitly noted that, despite the various functions available on mobile phones, the most used function of a mobile was still to make and receive calls and to send and receive text messages. In comparison, sending and receiving emails on mobile phones was less commonly used. Almost a third had never sent or received emails on their mobile phones before, and only one fifth did so on a daily basis. Similar findings have been reported in Australia (Kennedy *et al.* 2008), where a majority of students were relying heavily on their mobiles to call and text, but sending and receiving emails from mobiles had yet to enjoy a wider user base.

With regard to accessing the Internet on mobile phones, several respondents indicated that it was getting more and more popular amongst students. Seven in ten respondents indicated that they used a mobile phone to access the Internet on a daily basis, and the results from

the qualitative interviews further confirmed that an increasing number of students had access to the mobile Internet and appreciated the benefits that this brought to their university life, as discussed in detail in Chapter 6. Reflecting the growth of smartphone ownership worldwide, students' Internet access via handheld devices was growing rapidly. This corresponded with findings from the United States, where there has been a rapid growth in the use of mobile Internet in recent years (Smith and Caruso, 2010). The EDUCAUSE Center for Academic Transformation (ECAR) 2010 report showed that two-thirds (66.6%) of U.S. college students used their mobile phones to access the Internet weekly or more often, and more than 4 in 10 (42.6%) did so on a daily basis, compared with just half (49.5%) who did so weekly or more often and 3 in 10 (29%) who did so daily in 2009.

Table 5.9 Use of mobile phones

	Often	Occasionally	Never
Made and receive calls using a mobile phone	94.4	4.7	0.9
Used a mobile phone to send text messages	93.3	5.3	1.4
Used a mobile phone to send digital photos or movies to other people	69.1	23.9	7.0
Used a mobile phone as a personal organiser (e.g. diary, address book)	73.7	18.4	7.9
Used a mobile phone to send and received emails	43.3	21.8	34.9
Used a mobile phone to access information on the web	71.7	18.2	10.2



Figure 5.8 Use of mobile phones

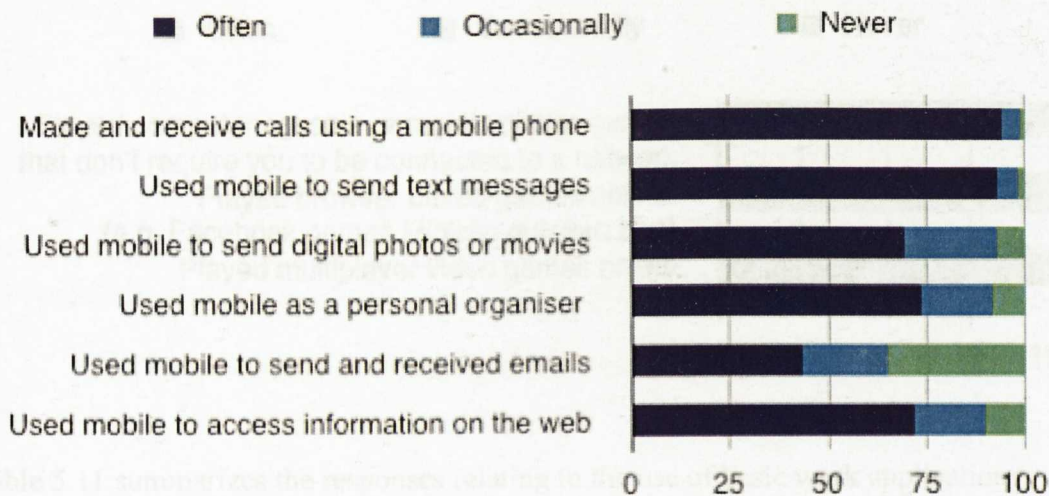


Table 5.10 summarizes the responses relating to gaming. The results suggested that offline computer games and mobile games were popular among students. More than half of the students surveyed played games on their console or mobile phones at least twice a week. Among these about one third played on a daily basis. Nevertheless, students’ access to games that required an Internet connection was much less. The results from the survey also suggested a significant gender difference in students’ use of games. However perhaps surprisingly, female students on average spent longer hours playing games (mobile phone games, browser-based games and online video games) than male students. This ran counter to studies in the United States (Kvavik, 2005) and the United Kingdom (Jones and Hosein, 2010) where young male students appeared to be the most game oriented.

Table 5.10 Use of games

	Often	Occasionally	Never
Played computer console or mobile phone games that don't require you to be connected to a network	60.4	20.4	19.2
Played browser based games online (e.g. Facebook games, Miniclip, quiz/puzzles)	50.1	22.1	27.8
Played multiplayer video games online	43.3	16.4	40.2

Figure 5.9 Use of games

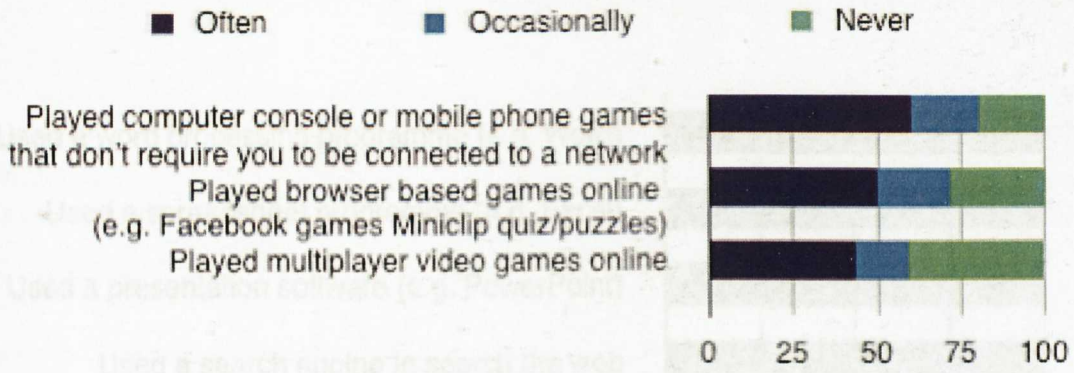


Table 5.11 summarizes the responses relating to the use of basic work applications including office programmes and search engines. Office programmes were popular among university students in China. A majority of the students used these programmes frequently, though this was still not yet universal. Word processing programmes and search engines were the most frequently used. Meanwhile, there were still about 15% of students who had never used them before. Spreadsheet programmes and presentation software were used less frequently, and about half of the population used presentation software more than twice a week, with about one fourth of the population who had never used presentation software before. Given that computer literacy had become a compulsory course in middle and high schools, it was surprising to see that about 15 to 25 % of the university students had never used these basic work applications, not to mention their actual competence levels.

Table 5.11 Use of basic work application

	Often	Occasionally	Never
Used a word processing programme (e.g. Word)	61.0	25.0	14.0
Used a spreadsheet programme (e.g. Excel)	51.8	30.3	17.9
Used a presentation software (e.g. PowerPoint)	43.1	31.6	25.2
Used a search engine to search the web	61.8	22.1	16.1



**Figure 5.10 Access to basic work application**

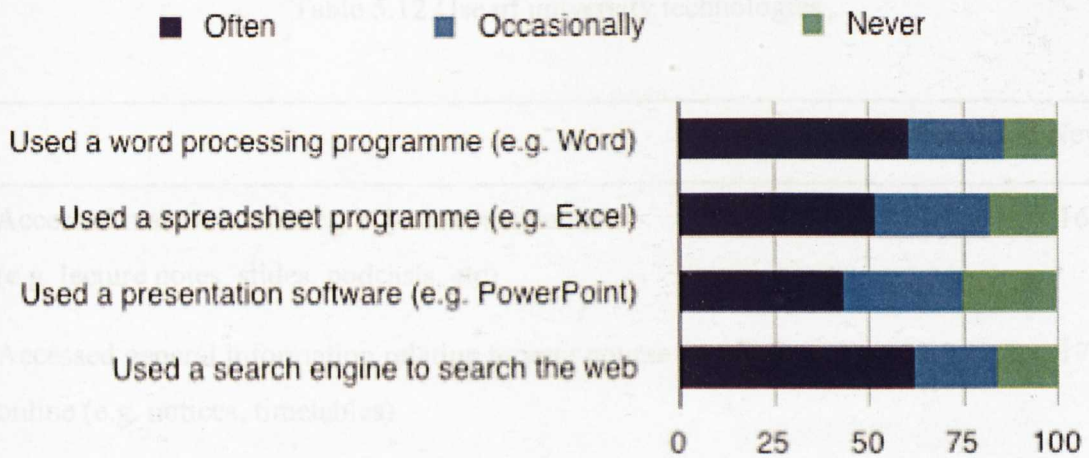


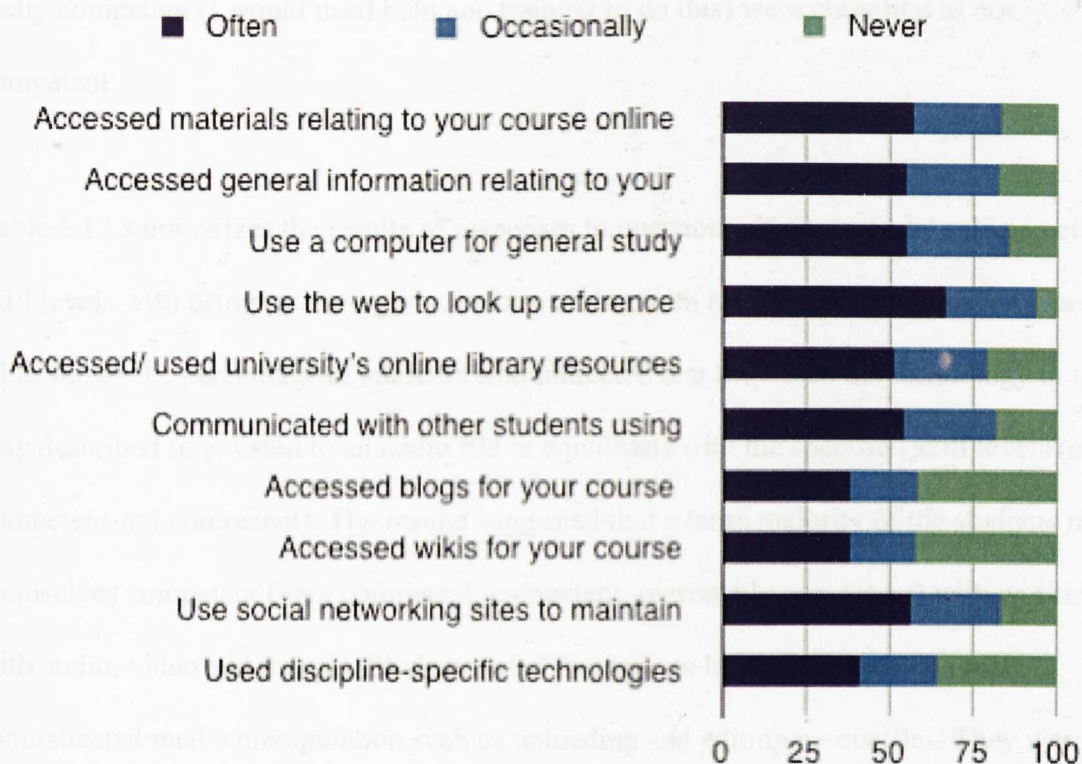
Table 5.12 summarizes the responses relating to questions on students' use of technologies for learning at university. The results suggested that the vast majority of the students used the Internet to look up references for study purposes. 66.8% of them used computers to do online searching for learning references at least twice a week. Most of the students also used a computer for general university study, such as accessing the web for online course materials, accessing the web for retrieving course information, or simply using a computer for general study without accessing the web. Furthermore, they spent a fair amount of time keeping in touch with fellow students or lecturers over the Internet. About half of the students spent at least twice a week communicating with other students either through the university's online services or other social networking sites. Nevertheless, their use of discipline-specific technologies or more sophisticated learning technologies such as course blogs and wikis was much less common. Although there has been a wide social adoption of technology in recent years, there has been only a limited take up in universities. Students tended to use the same technologies that the university supplied and the same technologies that they were required to use.



Table 5.12 Use of university technologies

	Often	Occasionally	Never
Accessed materials relating to your course online (e.g. lecture notes, slides, podcasts, etc)	56.7	27.1	16.2
Accessed general information relating to your course online (e.g. notices, timetables)	54.7	27.9	17.5
Use a computer for general study, without accessing the web	54.6	31.4	14.0
Use the web to look up reference information for study purposes	66.8	27.2	6.0
Accessed/ used university's online library resources	51.1	28.1	20.8
Communicated with other students using university online services (e.g. email, forums)	54.2	28.1	17.8
Accessed blogs for your course	38.0	20.6	41.6
Accessed wikis for your course	37.6	20.1	42.4
Use social networking sites to maintain contact with classmates/ lectures	56.6	26.9	16.5
Used discipline-specific technologies (e.g.Mathmatica, Matlab, AutoCAD, Stella etc.)	41.0	23.1	35.9

**Figure 5.11 Use of university technologies**



## 5.4 Students' skill levels with ICTs

This section reports the results concerning students' self-perceived skill levels with ICTs. In Section C of the questionnaire, students were asked to indicate their competence with a range of technology based tools, ranging from audio, video and images; messaging and chat; social networking sites; wikis, blogs and web 2.0; mobile phones; games/entertainment; Microsoft Office programme; to learning programmes for university studies. For the purpose of illustration, the different categories of competence level were combined together from the original questionnaire. Those who chose very competent (I can do this well and explain it to others) and competent (I can do this well without assistance) in the questionnaire were classified as competent; those who chose reasonably competent

(I can usually do this myself but may need help sometimes) and slightly competent (I can do this but often need help) were classified as needing assistance; and those who chose not really competent (I would need help and training to do this) were classified as not competent.

Table 5.13 summarizes the results of responses to questions about students' self-perceived skill levels with using technology-tools for working with audio, video and images. The table shows the percentage of students who indicated that they used the technology in the way described (e.g. listen to an audio file or a podcast) with the specified skill levels (e.g. competent-not competent). The results suggested that a large majority of the students rated themselves competent (very competent, competent, reasonably competent) with working with audio, video and images. Students rated themselves less competent with more sophisticated media manipulation such as uploading and editing media files. They were most competent with using a computer to watch videos, listen to audio files, upload photos to the Internet, and browse images. They are less competent with uploading, e.g. uploading audio to the web, editing a digital photo, and uploading video to the web respectively. Students rated themselves least competent with editing audio and video files on a computer.

Table 5.13 Skill levels with audio, video and images

	<b>Competent</b>	<b>Needing assistance</b>	<b>Not competent</b>
Listened to an audio file (e.g. MP3) or a podcast	87.1	7.9	4.9
Uploaded audio to the web	71.1	16.8	12.2
Edited digital audio on the computer	60.8	21.1	18.1
Browse photos on the web	83.9	11.7	4.4
Uploaded photo to the web	87.2	7.7	5.1
Edited a digital photo	77.8	13.5	8.7
Watched video online	89.0	7.9	3.1
Uploaded video to the web	77.6	18.9	13.5
Edited video on a computer	53.5	21.4	24.2

Table 5.14 summarizes the responses to questions relating to students' self-perceived skill levels with messaging and chat programmes. The results showed that the majority of students felt competent sending or receiving emails. Despite their frequent use of IM, not everyone felt confident in using them. While the majority felt competent with using IM, there were about 30% of the students who indicated they need help from others to use such software. This provided a contradictory picture to students' responses regarding text-based chat rooms, where a large number of students felt confident in using such chat rooms, but barely more than a third participated frequently. Nevertheless, with regard to more sophisticated audio and video chatting, including visiting virtual worlds, using Internet telephony and video conferencing, only about a quarter of the respondents felt confident. About a third of the students felt they were not competent and required systematic training.

In general, given the number of students who had never participated in these activities before and the number of students who felt they were not competent in using these applications, students were generally positive about their skill levels. Some felt competent even if they had never used such software before.

Table 5.14 Skill levels with messaging and chat

	Competent	Needing assistance	Not competent
Sent or responded to an email	73.3	22.9	3.8
Used an instant messenger	65.6	28.8	5.6
Participated in a text-based chat room	52.6	36.1	8.6
Visited a virtual world (e.g. Second Life, Lively, Active Worlds)	26.1	44.9	28.9
Used Internet telephony (VOIP): e.g. Skype	28.5	41.8	29.7
Used video conferencing via the web	25.7	39.4	34.9

Table 5.15 summarizes responses relating to skills with social networking technologies. Most students rated themselves competent in both using and contributing to social networking sites, including browsing other people’s profiles, editing their own profiles, posting messages, sending/receiving direct messages to others, and sharing files such as articles, photos or video clips, though there were still somewhat less than 10 % of the students who felt not competent. In comparison with traditional activities on social networking sites, students felt less competent using extra applications on social networking sites, such as sending and receiving gifts, little games and quizzes, which were less frequent though still common. Only about 40 % felt competent that they could operate

these extra applications without help. In general, students’ competence levels were consistent with their frequency in using social networking sites.

Table 5.15 Skill levels with social networking sites

	Competent	Needing assistance	Not competent
Browsed other people’s profiles on a social networking site	61.5	31.3	7.3
Edited my own social network profile	55.7	34.9	9.3
Posted messages on a social networking site	57.8	35.1	7.1
Sent/received direct messages to others on a social networking site	55.7	36.3	8.0
Share files on a social networking site (e.g. article, photo, video)	51.0	39.6	9.4
Comment on other’s shared files	52.7	38.8	8.6
Used the extra applications on a social networking site (e.g. gifts, constellation, fluffy friend, quizzes)	42.8	41.6	15.7

Table 5.16 summarizes responses to questions relating to students’ self-perceived skill levels with wiki, blogging and web 2.0 technologies. In accordance with students’ use of such technologies in table 5.7, many of the students did not feel competent with using more these technologies, especially with newer web 2.0 applications, such as RSS feeds and micro-blogging. In comparison with more traditional technologies, students gave themselves low ratings in this section. More than half of the respondents did not feel competent in using RSS feeds (51.6%), nor micro-blogging services, e.g. Twitter (55.7%).

Furthermore, only one third of the population felt confident in checking information from wiki sites, and fewer (29.6%) felt confident in editing or contributing to wiki sites. While less than half of the students rated themselves competent in reading other's blogs (46.1%), and commenting on other's blog entries (43.4%), only 37.1% could maintain their own blog without any advice or assistance from others. Out of those surveyed, the students who felt reasonably competent but would need assistance outnumbered those who were neutral. Comparing social bookmarking, file sharing, RSS feeds and micro-blogging, students felt relatively more competent with the former two than the latter. This trend was also consistent with their reported frequency of use of these technologies.

**Table 5.16 Skill levels with wikis, Blogs, and Web 2.0**

	<b>Competent</b>	<b>Needing assistance</b>	<b>Not competent</b>
Check information on Wikipedia or other wiki sites	36.8	39.2	24.0
Edited Wikipedia or other wiki sites	29.6	43.5	27.0
Read a blog	46.1	41.2	12.8
Maintained own blog	37.1	42.4	20.5
Comment on other's blog	43.4	40.6	16.0
Used a social bookmarking service (e.g. Delicious, Furl)	31.4	44.9	23.7
Used an RSS feed to provide you with a content	24.1	44.8	31.1
Used a file sharing service (e.g. Google Docs)	32.6	44.9	22.5
Used a micro-blogging service (e.g. Twitter, Fanfou, TaoTao)	20.2	43.7	36.1

Table 5.17 summarizes students’ responses relating to their self-perceived skill levels with the use of mobile phones. As expected, the vast majority of students felt competent in using basic mobile phone applications, including making/receiving phone calls , sending/receiving text messages , and sending picture/video messages. Nevertheless, there was still a minority of students, around 1%, who felt not competent in using these applications. With regard to more advanced use of mobile phones, including using their mobile phones as a personal organizer and accessing information on the web, still more than 70 % of the student population felt confident in doing so. Thus in comparison, students felt least competent in using mobile phones to send and receive emails. About 40% of the students felt neither totally not competent nor needing assistance in using mobile email, though the figure was slightly lower than the proportion of students who rarely used mobile emails.

Table 5.17 Skill levels with mobile phones

	Competent	Needing assistance	Not competent
Made and receive calls using a mobile phone	88.6	9.8	1.7
Used a mobile phone to send text messages	85.4	13.9	0.8
Used a mobile phone to send digital photos or movies to other people	78.0	20.2	1.8
Used a mobile phone as a personal organiser (e.g. diary, address book)	72.9	23.8	3.3
Used a mobile phone to send and receive emails	60.6	30.6	8.7
Used a mobile phone to access information on the web	73.1	22.4	4.5



Table 5.18 summarizes students’ responses relating to their perceived competency on gaming. Despite the popularity of games among students, not everyone rated themselves competent with games, especially multiplayer online video games. More than 25% of the students surveyed rated themselves not competent with multiplayer online video games, and only about a third (33.8 %) felt competent in playing these games without any assistance. More students rated themselves competent with browser-based online games and more than half of the students rated themselves competent playing games on computer consoles or mobile phones. Although the actual number of students (as shown in table 5.10) was less, more students felt they were competent in doing so. In other words, the reason for them not to play these games was not because they didn’t possess the necessary skills, but for other reasons to be explored further in the interviews.

Table 5.18 Skill levels with games

	Competent	Needing assistance	Not competent
Played computer console or mobile phone games that don't require you to be connected to a network	57.2	29.6	13.2
Played browser based games online (e.g. Facebook games, Miniclip, quiz/puzzles)	43.6	39.9	16.5
Played multiplayer video games online	33.8	38.6	27.6

Table 5.19 summarizes students’ responses relating to their self-perceived competence levels with the use of basic work software including office programmes and search engines. Perhaps surprisingly, given the wide availability of Microsoft office software and search engine providers such as Google and the Chinese equivalent Baidu, only slightly more than

half of the students (57.3%) rated themselves competent in using word processing software, and even fewer felt competent in using spreadsheet programmes (49.1%), presentation software (38.3%) and search engines (50.6%). A large number of the students would require assistance in using these technologies and about a tenth of the student population did not know how to use these at all. Comparing this with students' frequency of use (table 5.11), students rated themselves less confidently than their actual frequency of use might lead one to expect. In other words, out of those who used these basic work applications frequently (at least twice a week), not everyone felt completely competent. Some students needed assistance even with basic work applications.

Table 5.19 Skill levels with computer software

	Competent	Needing assistance	Not competent
Used a word processing programme (e.g. Word)	57.3	34.3	8.4
Used a spreadsheet programme (e.g. Excel)	49.1	41.8	9.2
Used a presentation software (e.g. PowerPoint)	38.3	47.1	14.6
Used a search engine to search the web	50.6	37.6	11.7

Table 5.20 summarizes students' responses relating to questions on their competence on learning with technologies at university. The results suggested that most students felt competent in using computers for general university study, such as accessing online course materials or general administration information, looking up study references, using the university's online library, or keeping in touch with other fellow students or lecturers using the university's online services or via social networking sites. However, with regard to discipline-specific technologies and more sophisticated learning technologies such as

course blogs and wikis, a considerable number of students rated themselves not competent. Student were notably least competent in using course-specific software, and less than a third (29.5%) rated themselves competent in using such software without any assistance from others.

Table 5.20 Skill levels with using technology at university

	<b>Competent</b>	<b>Needing assistance</b>	<b>Not competent</b>
Accessed materials relating to your course online (e.g. lecture notes, slides, podcasts, etc)	52.3	39.1	8.6
Accessed general information relating to your course online (e.g. notices, timetables)	48.7	43.7	7.6
Use a computer for general study, without accessing the web	50.2	42.3	7.5
Use the web to look up reference information for study purposes	55.9	38.6	5.5
Accessed/ used university's online library resources	45.3	45.1	9.7
Communicated with other students using university online services (e.g. email, forums)	49.0	42.3	8.7
Accessed blogs for your course	31.6	48.9	19.5
Accessed wikis for your course	30.8	46.9	22.3
Use social networking sites to maintain contact with classmates/ lectures	45.0	45.1	9.9
Used discipline-specific technologies (e.g.Mathmatica, Matlab, AutoCAD, Stella etc.)	29.5	46.8	23.7

## 5.5 Attitudes toward the use of ICTs for learning

This section reports on the results concerning students' attitudes towards the use of ICTs for learning at university. Section D of the questionnaire asked the respondents to indicate whether they found certain kinds of online activities useful for their study and whether they agreed with certain statements regarding ICT applications at university.

For the purposes of illustration, the different categories of level of agreement from the original questionnaire were combined. 'Strongly agree' and 'agree' as originally expressed in the questionnaire was categorized as agree; 'neither agree nor disagree' was categorized as neutral; 'mostly disagree' and 'strongly disagree' were categorized as disagree.

Similarly, 'very useful' and 'useful' as originally worded in the questionnaire were categorized as useful; 'neither useful nor useless' was categorized as neutral; 'not very useful' and 'not useful at all' were categorized as not useful. Detailed results with the original categories can be found in appendix C.

A frequency count showed that 76.3% of the respondents were enthusiastic about using ICT to assist with their studies, one in five remained neutral, and only 4.3% were not enthusiastic. While the majority of students generally felt enthusiastic about using ICTs to assist with their studies, but they also occasionally felt that they had been overwhelmed by the thrive of new technology applications at university. Almost half of the respondents indicated that they felt that the importance of ICT in education had been overestimated. In terms of detailed applications of ICTs to improve students' learning, the respondents' attitudes were equally split among three groups, 33.2% were clear, 33.7% were neutral while 33.1% remained unsure. Prior to coming to university, almost 70% of the students

had expected to rely on the use of computers at university, and they had expected that the university would help them to master the ICT skills that they needed.

Table 5.21 Attitudes towards using ICTs at university

	Agree	Ambivalence	Disagree
I am enthusiastic about using ICT to assist with my studies.	76.3	19.4	4.3
I think that the importance of using ICT in education is overestimated.	43.9	38.0	18.1
I am not clear about how the use of ICT can improve my learning.	33.2	33.7	33.1
I didn't expect to rely on the use of computers at university.	36.5	29.9	33.6
I expect the university would help me to master the ICT skills I need.	69.6	20.3	10.0

Section D question 5 asked students to indicate whether they found certain university activities with technology useful for their study. Of all the activities in question, the university's online library was regarded as the most useful application overall. The least useful were playing online games and visiting virtual worlds. Despite the increasing advocacy of using games to assist with learning, the students had not yet accepted the benefits of learning through games for their university study. Course related online activities, e.g. accessing online material relating to their course, accessing online reading or links to course related material and using special software supplied by university were all perceived to be useful. It is particularly pertinent that students found accessing the mobile Internet useful to help with their studies. With the rapid fall in the cost of smartphones, more and more users will access the web using mobile phones in the years to

come. Providing well designed course/learning materials on portable devices seems to be one of the ways ahead for universities in China.

Table 5.22 Usefulness of technological activities at university

	Useful	Ambivalence	Not useful
University's online library resources and catalogues	69.7	22.0	8.3
Turning in assignments online	51.4	33.6	14.9
Online discussion board (posting comments and questions)	53.7	33.7	12.6
Online readings and links to other text-based course materials	58.3	29.8	11.9
Social networking sites	52.5	33.9	13.6
Using specialist software/computing supplied by the university	59.0	29.6	11.5
Internet on your mobile phone	59.0	28.0	13.0
Being able to work with other students online	59.0	29.3	11.6
Accessing materials relating to your course online	62.6	25.5	11.9
Being able to contact your tutor/ lecture online	56.6	29.2	14.1
Playing computer games	33.1	34.6	32.3
Visiting online virtual worlds	30.2	34.1	35.7

In section D question 6 of the questionnaire, students were again asked to indicate whether or not they agreed with a set of statements with regard to the use of ICTs at university.

More than 60% of the respondents were excited about the use of technologies at university, and recognized the importance of using technology to facilitate their studies at university. Most of them believed that utilizing modern technology could help with their study and that mastering new technology could enrich their skill sets and provide them with an advantage in future job hunting. However, when asked how respondents felt that technology had worked on their course, about half of the students felt technology had worked well on their course while 13.3% held the opposite opinion. Only 44.9% of the respondents felt that the use of ICT at university had met their expectation. Furthermore, half of the respondents were not confident that they could obtain the support that they needed from the university in the use of ICT.

Table 5.23 ICT provision at university

	Agree	Ambivalence	Disagree
The use of technology seems to be particularly important on my courses at university.	66.4	25.4	8.2
Overall the technology worked well on my courses	54.1	32.6	13.3
I am excited by the use of ICT at university.	63.8	28.5	7.7
It would be good if there was much more use of ICT in my courses.	61.2	28.7	10.1
ICT usage at university has met my expectations.	44.9	34.9	20.2
The way I work with others using the technology seems more important than the subject content on my courses.	44.9	36.4	18.7
I find using technological devices difficult.	37.4	35.0	27.6
I could get technical support I need either from the university.	44.7	35.6	19.7

	Agree	Ambivalence	Disagree
Using the technology at university suits the way I do my work.	46.6	36.4	17.0
Technology allows me to contact as often as I need with my tutors.	48.8	35.6	15.6
Technology allows me to interact with students on my courses.	54.4	31.9	13.7
I enjoy working online in groups with other students at university.	50.2	35.2	14.6
I have learned new skills using the technology at university.	59.7	27.8	12.6
The technology I use at university might help me in my future career.	64.5	24.6	10.9
The way technology has been used at university benefited my learning	61.4	25.9	12.7

## ***5.6 Factor analysis***

This section reports on the results of the factor analyses that were carried out. As a method of data exploration, factor analysis is used to investigate the interrelationships among a set of variables in order to identify any common underlying dimensions. Meanwhile, as a tool of data reduction (Tabachnick & Fidell, 2007), factor analysis is often employed as a way of condensing information originally obtained from a large set of variables to a smaller set of dimensions with a minimum loss of information. In the context of this study, it was hoped that factor analysis would allow exploration of the relationships between the different scale items featured in the questionnaire, and to assess whether these scale items



were measuring the same dimensions of students experience with ICTs at university with respect to their access, skills levels, and attitudes to ICTs.

### **5.6.1 First-Order factor analysis**

Five separate factor analyses was carried out on the responses to section B question 4, section C, section D question 1, section D question 5 and section D question 6 of the questionnaire. The responses were first subjected to principal components analysis (PCA) using SPSS version 17. Prior to performing PCA the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Okin value exceeded the recommended value of .6 (Kaiser, 1970, 1974) and the Barlett's Test of Sphericity (Bartlett, 1954) reached statistical significance, supporting the factorability of the correlation matrix.

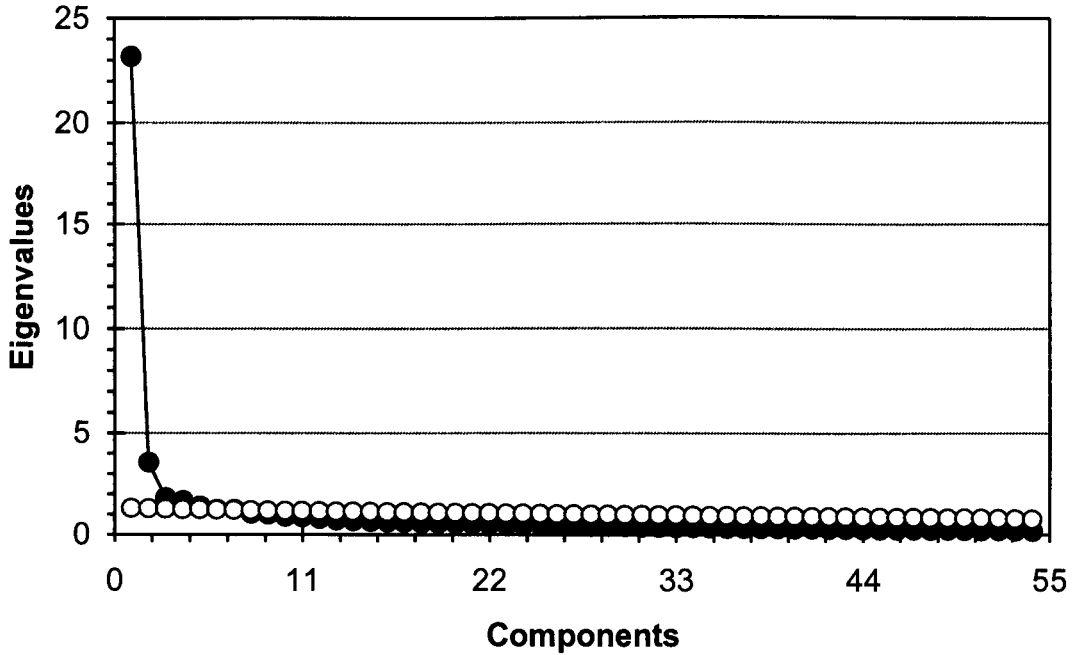
Eigenvalues, Catell's (1966) scree test, and parallel analysis were used to determine the number of factors to extract. As explained earlier in Chapter 4, one of the most accurate ways of deciding how many factors to extract is to compare the observed eigenvalues with those expected from a random correlation matrix. In this study, O'Connor's (2000) program was used to generate mean expected eigenvalues for 1000 random correlation as initial communality estimates. To aid in the interpretation of the components, oblique rotation was performed. The rotated solution revealed the presence of simple structure (Thurstone, 1947), with all components showing a number of strong loadings and all variables loading substantially on only at most one component.

### 5.6.1.1 Section B4: How often do you perform the following activities?

The responses to the 54 items in Section B question 4 of the questionnaire were subjected to a factor analysis. Section B question 4 asked students how often they performed a range of activities. Prior to performing principal component analysis the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Okin value was .977, exceeding the recommended value of .6 (Kaiser, 1970, 1974) and the Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance ( $X^2 = 94259.641$ ,  $df = 1431$ ,  $p < 0.001$ ), supporting the factorability of the correlation matrix.

A principal components analysis revealed the presence of eight components with eigenvalues greater than one, explaining 42.9%, 6.6%, 3.4%, 3.1%, 2.6%, 2.3%, 2.3%, 1.9% of the variance respectively. However, the eigenvalues-greater-than-one rule in practice tends to overestimate the true number of components in a data set (Richardson, 1994). An inspection of the scree plot revealed a break after the seventh component. Using Catell's (1966) scree test, it was decided to retain seven components for further investigation. This was further supported by the results of the Parallel Analysis. The open circles in Figure 5.12 shows the results of a parallel analysis of 1000 random correlation matrices using the program written by O'Connor (2000). Only seven components obtained eigenvalues greater than the corresponding criterion values for a randomly generated data matrix of the same size. This confirmed that seven components should be extracted from the data set. Please refer to table 5.52 in the appendix for detailed observed and expected eigenvalues.

**Figure 5.12: Scree plot for Section B data**



The filled circles represent the observed eigenvalues and the open circles represent the expected eigenvalues.

Accordingly, principal axis factor analysis was used to extract seven factors, with squared multiple correlation as initial communality estimates, and the extracted factor matrix was submitted to oblique rotation by the quartimin method.

In presenting the results, the items are identified in descending order of magnitude of their loadings followed by their loadings on the relevant factors. Loadings greater than .40 in absolute magnitude were regarded as salient for the purpose of interpretation. Items that showed salient loadings on each factor are listed in a decreasing order of the absolute magnitude of their loadings, and the factors are labelled on the basis of the items with the highest loading.

The first factor showed salient loadings on the following items, and it was labelled **Use of wikis, blogs and web 2.0 (Use of blogging)**:

qb4d\_5. Comment on other's blog (.58)

qb4d\_4. Maintained own blog (.57)

qb4d\_3. Read a blog (.55)

qb4d\_6. Used a social bookmarking service (e.g. Delicious, Furl) (.51)

qb4f\_2. Played browser based games online(e.g. Facebook games, Miniclip, quiz/puzzles) (.43)

qb4d\_7. Used an RSS feed to provide you with a content (.43)

qb4d\_1. Check information on Wikipedia or other wiki sites (.42)

qb4d\_9. Used a micro-blogging service (e.g. Twitter, Fanfou,TaoTao) (.42)

qb4d\_8. Used a file sharing service (e.g. Google Docs) (.42)

qb4f\_3. Played multiplayer video games online (.41)

qb4d\_2. Edited Wikipedia or other wiki sites (.40)

The second factor showed salient loadings on the following items, and it was labelled **Use of mobile phones (Use of mobile phones)**:

qb4e\_2. Used a mobile phone to send text messages (.72)

qb4e\_1. Made and receive calls using a mobile phone (.69)

qb4e\_3. Used a mobile phone to take digital photos or movies (.63)

qb4e\_4. Used a mobile phone as a personal organiser (e.g. diary, address book) (.61)

qb4e\_6. Used a mobile phone to access information on the web (.54)

The third factor showed salient loadings on the following items, and it was labelled **Use of social networking sites (Use of social networking)**:

qb4c\_4. Sent/received direct messages to others on a social networking site (.79)

qb4c\_2. Edited my own social network profile (.77)

qb4c\_1. Browsed other people's profiles on a social networking site (.75)

qb4c\_3. Posted messages on a social networking site (.74)

qb4c\_5. Share files on a social networking site (e.g. article, photo, video) (.68)

qb4c\_6. Comment on other's shared files (.61)

qb4c\_7. Used the extra applications on a social networking site (.40)

The fourth factor showed salient loadings on the following items, and it was labelled

**Advanced use of applications (Use of interactive technologies):**

qb4b\_4. Visited a virtual world (e.g. Second Life, Lively, Active Worlds) (.61)

qb4a\_9. Edited video on a computer (.59)

qb4b\_6. Used video conferencing via the web (.58)

qb4a\_3. Edited digital audio on the computer (.57)

qb4a\_2. Uploaded audio to the web (.55)

qb4a\_8. Uploaded video to the web (.55)

qb4b\_5. Used Internet telephony (VOIP): e.g. Skype (.55)

qb4e\_5. Used a mobile phone to send and received emails (.42)

The fifth factor showed salient loadings on the following items, and it was labelled **Use of images (Use of digital photography):**

qb4a\_4. Browse photos on the web (.64)

qb4a\_5. Uploaded photo to the web (.55)

qb4a\_7. Watched video online (.54)

The sixth factor showed salient loadings on the following items, and it was labelled **Use of basic work applications (Use of Office)**:

qb4g\_2. Used a spreadsheet programme (e.g. Excel) (.81)

qb4g\_1. Used a word processing programme (e.g. Word) (.78)

qb4g\_3. Used a presentation software (e.g. PowerPoint) (.71)

qb4g\_4. Used a search engine to search the web (.43)

The seventh factor showed salient loadings on the following items, and it was labelled **Use of ICT for study (Use of learning)**:

qb4h\_5. Accessed/ used university's online library resources (.65)

qb4h\_4. Use the web to look up reference information for study purposes (.62)

qb4h\_3. Use a computer for general study, without accessing the web (.59)

qb4h\_6. Communicated with other students using university online services (e.g. email, forums) (.57)

qb4h\_2. Accessed general information relating to your course online (e.g. notices, timetables) (.52)

qb4h\_7. Accessed blogs for your course (.52)

qb4h\_8. Accessed wikis for your course (.49)

qb4h\_9. Use social networking sites to maintain contact with classmates/ lectures (.47)

qb4h\_1. Accessed materials relating to your course online (e.g. lecture notes, slides, podcasts, etc) (.45)

qb4h\_10. Used discipline-specific technologies (e.g. Mathematica, Matlab, AutoCAD, Stella etc.) (.42)

The rotated solution exhibited 48 out of 54 items that showed salient loadings, and no items showed salient loadings on more than one factor. The 6 items that did not show salient loadings on any of the factors are:

qb4f\_1. Played computer console or mobile phone games that don't require you to be connected to the Internet. (.30)

qb4a\_1. Listen to an audio file (e.g. MP3) or a podcast (.26)

qb4b\_3. Participated in a text-based chat room (. 38)

qb4b\_1. Sent or responded to an email (.30)

qb4b\_6. Edited a digital photo (-. 39)

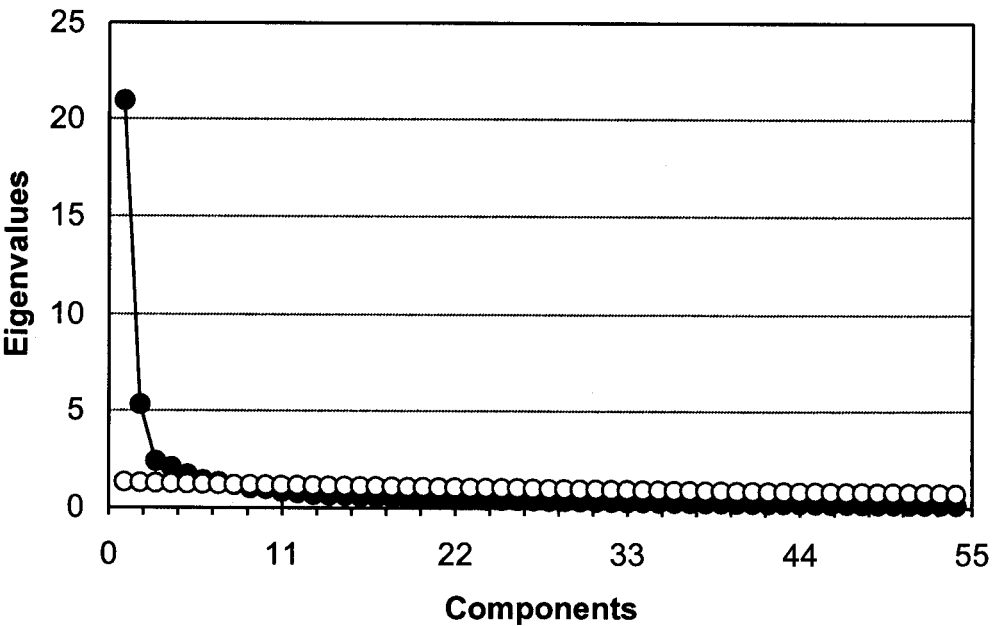
qb4b\_2. Used an instant messenger (-.33)

#### **5.6.1.2 Section C1 How competent are you in performing the following activities?**

The responses to the 54 items in Section C question 1 of the questionnaire were subjected to a factor analysis. Section C question 1 asked students how competent they were in performing a range of activities. Following procedures described earlier, prior to performing principal component analysis the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Olkin value was .968, exceeding the recommended value of .6 (Kaiser, 1970, 1974) and Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance ( $X^2 = 102236.268$ ,  $df = 1431$ ,  $p < 0.001$ ), supporting the factorability of the correlation matrix.

A principal components analysis revealed the presence of eight components with eigenvalues greater than one, explaining 38.8%, 9.8%, 4.4%, 3.8%, 3.1%, 2.6%, 2.4%, and 2.2% of the variance respectively. The open circles in Figure 5.13 show the results of a parallel analysis of 1000 random correlation matrices using the program written by O'Connor (2000). Only seven components obtained eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix. This confirmed that seven components should be extracted from the data set. Please refer to table 5.53 in the appendix for detailed observed and expected eigenvalues.

**Figure 5.13: Scree plot for section C data**



Accordingly, principal axis factoring was used to extract seven factors, with squared multiple correlation as initial communality estimates, and the extracted factor matrix was submitted to oblique rotation by the quartimin method.

The first factor showed salient loadings on the following items, and it was labelled **Competence with social networking sites (Skill levels with social networking):**

qc1c\_3. Posted messages on a social networking site (.82)



qc1c\_4. Sent/received direct messages to others on a social networking site (.81)

qc1c\_2. Edited my own social network profile (.77)

qc1c\_6. Comment on other's shared files (.76)

qc1c\_5. Share files on a social networking site (e.g. article, photo, video) (.74)

qc1c\_1. Browsed other people's profiles on a social networking site (.65)

qc1c\_7. Used the extra applications on a social networking site (.57)

The second factor showed salient loadings on the following items, and it was labelled

**Competence with mobile phones (Skill levels with mobile phones):**

qc1e\_2. Used a mobile phone to send text messages (.85)

qc1e\_3. Used a mobile phone to take digital photos or movies (.82)

qc1e\_4. Used a mobile phone as a personal organiser (e.g. diary, address book) (.77)

qc1e\_6. Used a mobile phone to access information on the web (.75)

qc1e\_1. Made and receive calls using a mobile phone (.71)

qc1e\_5. Used a mobile phone to send and received emails (.55)

The third factor showed salient loadings on the following items, and it was labelled

**Competence with using ICT for study (Skill levels with learning):**

qc1h\_4. Use the web to look up reference information for study purposes (.68)

qc1h\_6. Communicated with other students using university online services (e.g. email, forums) (.66)

qc1h\_5. Accessed/ used university's online library resources (.65)

qc1h\_3. Use a computer for general study, without accessing the web (.63)

qc1h\_2. Accessed general information relating to your course online (e.g. notices, timetables) (.63)

qc1h\_1. Accessed materials relating to your course online (e.g. lecture notes, slides, podcasts, etc) (.56)

qc1h\_9. Use social networking sites to maintain contact with classmates/ lectures (.54)

qc1h\_7. Accessed blogs for your course (.51)

qc1h\_8. Accessed wikis for your course (.45)

qc1h\_10. Used discipline-specific technologies (e.g.Mathmatica, Matlab, AutoCAD, Stella etc.) (.44)

The fourth factor showed salient loadings on the following items, and it was labelled

**Competence with advanced use of applications (Skill levels with interactive technologies):**

qc1a\_3. Edited digital audio on the computer (.76)

qc1a\_2. Uploaded audio to the web (.71)

qc1a\_9. Edited video on a computer (.65)

qc1a\_8. Uploaded video to the web (.59)

qc1a\_6. Edited a digital photo (.58)

qc1a\_5. Uploaded photo to the web (.49)

qc1a\_1. Listened to an audio file (e.g. MP3) or a podcast (.47)

qc1b\_4. Visited a virtual world (e.g. Second Life, Lively, Active Worlds) (.44)

The fifth factor had no salient loadings and could not therefore be interpreted.

The sixth factor showed salient loadings on the following items, and it was labelled

**Competence with wikis, blogs and web 2.0 (Skill levels with blogging):**

qc1d\_3. Read a blog (.64)

qc1d\_5. Comment on other's blog (.62)

qc1d\_4. Maintained own blog (.59)

qc1d\_1. Check information on Wikipedia or other wiki sites (.58)

qc1d\_2. Edited Wikipedia or other wiki sites (.56)

qc1d\_6. Used a social bookmarking service (e.g. Delicious, Furl) (.53)

qc1d\_7. Used an RSS feed to provide you with a content (.44)

qc1d\_9. Used a micro-blogging service (e.g. Twitter, Fanfou, TaoTao) (.43)

qc1d\_8. Used a file sharing service (e.g. Google Docs) (.42)

The seventh factor showed salient loadings on the following items, and it was labelled

**Competence with basic work application (Skill levels with Office):**

qc1g\_2. Used a spreadsheet programme (e.g. Excel) (.66)

qc1g\_1. Used a word processing programme (e.g. Word) (.66)

qc1g\_3. Used a presentation software (e.g. PowerPoint) (.57)

qc1f\_1. Played computer console or mobile phone games that don't require you to be connected to a network (.50)

qc1f\_2. Played browser based games online (e.g. Facebook games, Miniclip, quiz/puzzles) (.48)

qc1f\_3. Played multiplayer video games online (.44)

The rotated solution exhibited 46 out of 54 items that showed salient loadings, and no items showed salient loadings on more than one factor. The 8 items that did not show salient loadings on any of the factors are:

qc1b\_3. Participated in a text-based chat room (.30)

qc1b\_2. Used an instant messenger (.32)

qc1b\_1. Sent or responded to an email (.27)

qc1a\_4. Browse photos on the web (.27)

qc1b\_6. Used video conferencing via the web (.396)

qc1b\_5. Used Internet telephone (VOIP): e.g. Skype (. 38)

qc1a\_7 Watched a video online (.26)

qc1g\_4. Used a search engine to search the web (.35)

### **5.6.1.3 Section D1: Attitudes to the use of ICT**

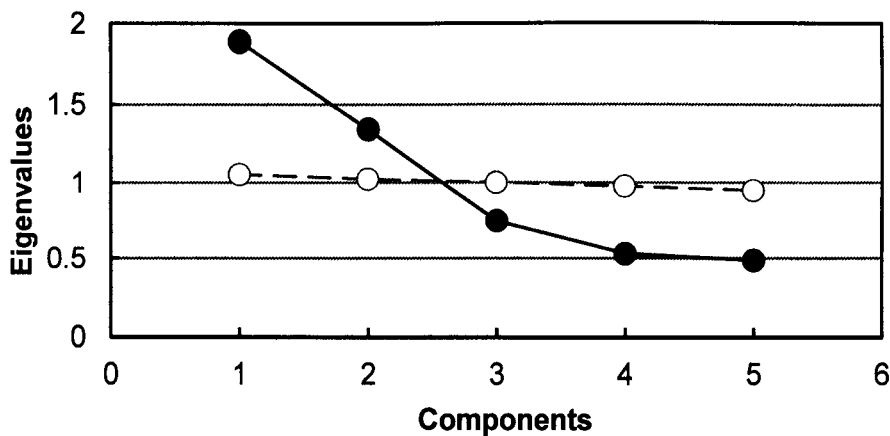
The responses to the 5 items in Section D1 of the questionnaire were also subjected to a factor analysis. Again, prior to performing principal component analysis the suitability of data for factor analysis was assessed. The Kaiser-Meyer-Okin value was .589 and the Barlett's Test of Sphericity (Bartlett, 1954) reached statistical significance ( $X^2 = 94259.641$ ,  $df = 1431$ ,  $p < 0.001$ ). As Tabachnick and Fidell (2006, p.634) recommended, 'Kaiser-Meyer-Okin values above .6 are required for good factor analysis', these data should be treated in a tentative way.

A principal component analysis revealed two principal components with eigenvalues greater than one, and these explained 64.7% of the total variance. The open circles in Figure 5.14 show the results of a parallel analysis of 1000 random correlation matrices using the program written by O'Connor (2000). Only two components obtained eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix. This confirmed that two components should be extracted from the data set.

Accordingly, principal axis factoring was used to extract two factors. However, attempting to extract two factors led to a 'Heywood Case', which is a situation where the factor analysis program tries to estimate a factor loading beyond the logical upper limit of 1.00. It

usually indicates that there are too few variables available to measure one or more of the factors (which is fairly obvious in this case). Therefore only one factor has been extracted.

Figure 5.14: Scree plot for section D1 data



The factor showed salient loadings on the following items, and it was labelled **Ambivalence about the use of ICT at university (Ambivalence):**

- qd1\_3. I am not clear about how the use of ICT can improve my learning (.66)
- qd1\_2. I think that the importance of using ICT in education is overestimated. (.65)
- qd1\_4. I didn't expect to rely on the use of computers at university (.59)

The factor analysis exhibited 3 out of 5 items that showed salient loadings, and no items showed salient loadings on more than one factor. The 2 items that did not show salient loadings on any of the factors are:

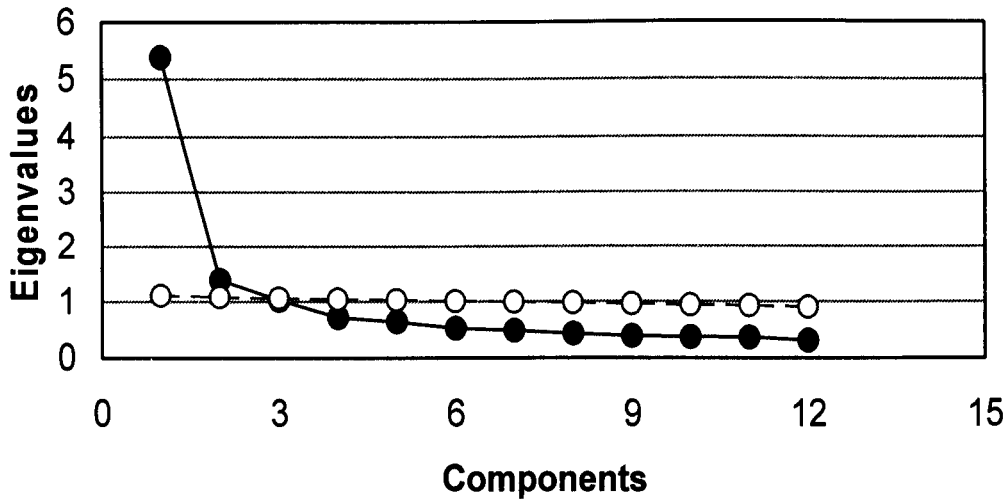
- qd1\_1. I am enthusiastic about using ICT to assist with my studies (.20)
- qd1\_5. I expect the university would help me to master the ICT skills I need (.10)

#### **5.6.1.4 Section D5: How useful do you find the following activities in your study?**

The responses to the 12 items in Section D5 of the questionnaire were subjected to a factor analysis. Section D5 asked students to rate how useful they found the activities in their studies. Prior to performing a principal component analysis the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Okin value was .900, exceeding the recommended value of .6 (Kaiser, 1970, 1974) and the Barlett's Test of Sphericity (Bartlett, 1954) reached statistical significance ( $X^2 = 13650.193$ ,  $df = 66$ ,  $p < 0.001$ ), supporting the factorability of the correlation matrix.

A principal components analysis revealed the presence of three components with eigenvalues greater than one, explaining 44.8%, 11.6%, and 8.5% of the variance respectively. However, an inspection of the scree plot revealed a break after the second component. This was further supported by the results of the Parallel Analysis. The open circles in figure 5.15 showed a parallel analysis of 1000 random correlation matrices using the program devised by O'Connor (2000). Only two principal components obtained eigenvalues greater than what would be expected from purely random data, and this confirms that two components should be extracted.

**Figure 5.15: Scree plot for section D5 data**



Accordingly, principal axis factoring was used to extract two factors, with squared multiple correlation as initial communality estimates, and the extracted factor matrix was submitted to oblique rotation by the quartimin method.

The first factor showed salient loadings on the following items, and it was labelled **Perceived Usefulness (Attitude to learning):**

- qd5\_9. Accessing materials relating to your course online (.792)
- qd5\_8. Being able to work with other students online (.765)
- qd5\_4. Online readings and links to other text-based course materials (.756)
- qd5\_6. Using specialist software/computing supplied by the university (.720)
- qd5\_5. Social networking sites (.691)
- qd5\_10. Being able to contact your tutor/ lecture online (.656)
- qd5\_3. Online discussion board (posting comments and questions) (.650)
- qd5\_7. Internet on your mobile phone (.553)
- qd5\_1. University's online library resources and catalogues (.519)
- qd5\_2. Turning in assignments online (.462)

The second factor showed salient loadings on the following items, and it was labelled

**Usefulness of games and stimulations for study (Attitude to gaming):**

qd5\_12. Visiting online virtual worlds (.857)

qd5\_11. Playing computer games (.761)

All the 12 items showed salient loadings on the rotated solution, and no items showed salient loadings on more than one factor.

### **5.6.1.5 Section D6: Usefulness of learning activities**

The responses to the 20 items in Section D6 of the questionnaire were subjected to a factor analysis. Section D6 asked whether students agree or disagree with the statements listed. Prior to performing principal component analysis the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Olkin value was .921, exceeding the recommended value of .6 (Kaiser, 1970, 1974) and the Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance ( $X^2 = 19864.881$ ,  $df = 190$ ,  $p < 0.001$ ), supporting the factorability of the correlation matrix.

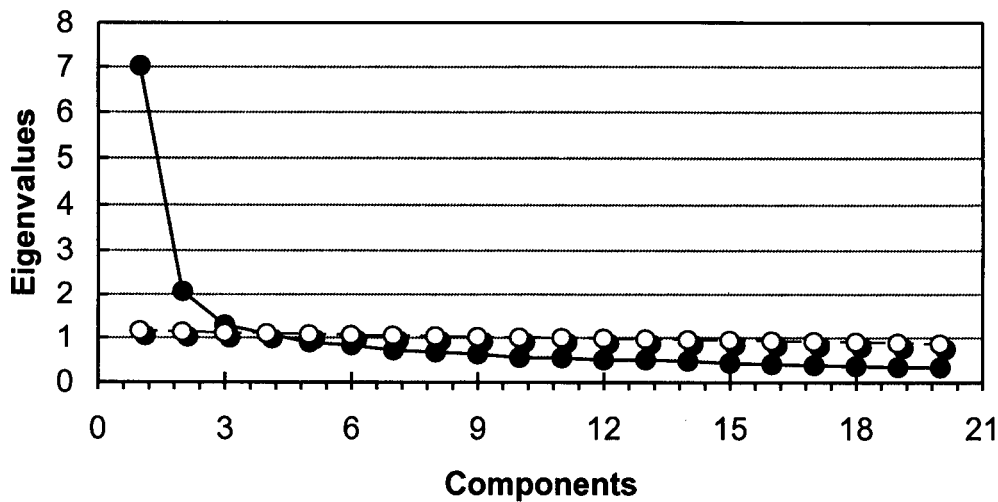
Principal components analysis revealed the presence of four components with eigenvalues greater than one, explaining 35.1%, 10.3%, 6.5% and 5.4% of the variance respectively.

However, an inspection of the scree plot revealed a break after the third component. Using Catell's (1966) scree test, it was decided to retain three components for further investigation. This was further supported by the results of the Parallel Analysis. The open circles in figure 5.16 showed a parallel analysis of 1000 random correlation matrices using



the programme devised by O'Connor (2000). Only three principal component obtained eigenvalues greater than what would be expected from purely random data, and this confirms that three components should be extracted from the data set.

**Figure 5.16: Scree Plot for the Section D6 usefulness of learning activities data**



Accordingly, principal axis factor analysis was used to extract three factors, with squared multiple correlation as initial communality estimate, and the extracted factor matrix was submitted to oblique rotation by the quartimin method.

In presenting results, the items are identified by their sequential order followed by their loadings on the relevant factors. Loadings greater than .40 in absolute magnitude were regarded as salient for the purpose of interpretation. Items that showed salient loadings on each factor are listed in a decreasing order of the absolute magnitude of their loadings, and the factors are labelled on the basis of the items with the highest loading.

The first factor showed salient loadings on the following items, and it was labelled

**Benefits of ICT (Attitudes to usefulness):**

- qd6\_19. The technology I use at university might help me in my future career. (.81)
- qd6\_20. The way technology has been used at university benefited my learning. (.78)
- qd6\_18. I have learned new skills using the technology at university (.75)
- qd6\_16. Technology allows me to interact with students on my courses. (.69)
- qd6\_17. I enjoy working online in groups with other students at university. (.60)
- qd6\_15. Technology allows me to contact as often as I need with my tutors. (.55)
- qd6\_14. Using the technology at university suites the way I do my work. (.46)
- qd6\_4. It would be good if there was much more use of ICT in my courses. (.42)
- qd6\_11. I could get technical support I need either from the university or the teacher. (.40)

The second factor showed salient loadings on the following items, and it was labelled

**Negative experience with ICT (Negative attitudes):**

- qd6\_8. I find using technological devices difficult. (.72)
- qd6\_10. The technology we use distracts me from the course content. (.65)
- qd6\_13. Using the technology requires more time than I can afford. (.57)
- qd6\_9. I could not check the validity of information I find on the Internet. (.55)
- qd6\_6. My course concentrated on the subject content, what I had to learn, not the technology. (.47)

The third factor showed salient loadings on the following items, and it was labelled

**Positive experience with ICT (Positive attitudes):**

- qd6\_2. Overall the technology worked well on my courses (.83)
- qd6\_1. The use of technology seems to be particularly important on my courses at university. (.71)

qd6\_3. I am excited by the use of ICT at university. (.45)

The rotated solution exhibited 17 out of 20 items that showed salient loadings, and no items showed salient loadings on more than one factor. The 3 items that did not show salient loadings on any of the factors are:

qd6\_12. I could get technical support I need from the university (.33)

qd6\_7. The way I work with others using the technology seems more important than the subject content (.36)

qd6\_5. ICT usage at university has met my expectations (.396)

5.6.1.6 Summary

In summary, nineteen factor-based scales were constructed by computing the mean scores across the relevant subsets of the 175 items in the questionnaire. The scores showed satisfactory internal consistency as indicated by Cronbach’s (1951) coefficient alpha, as shown in table 5.24 below.

Table 5.24 Cronbach’s coefficient alpha for first-order factors

Factor	items	Cronbach’s alpha
Use of wikis, blogs and web 2.0	qb4d_1, qb4d_2, qb4d_3, qb4d_4, qb4d_5, qb4d_6, qb4d_7, qb4d_8, qb4d_9, qb4f_2 and qb4f_3	$\alpha = .93$
Use of mobile phones	qb4e_1, qb4e_2, qb4e_3, qb4e_4, qb4e_6	$\alpha = .76$
Use of social networking sites	qb4c_1, qb4c_2, qb4c_3, qb4c_4, qb4c_5, qb4c_6, qb4c_7	$\alpha = .92$
Advanced use of applications Technology	qb4a_2, qb4a_3, qb4a_8, qb4a_9, qb4b_4, qb4b_5, qb4b_6, qb4e_5	$\alpha = .92$

Use of images	qb4a_4, qb4a_5, qb4a_7	$\alpha = .78$
Use of basic work applications Software	qb4g_1, qb4g_2, qb4g_3, qb4g_4	$\alpha = .85$
Use of ICT for study	qb4h_1, qb4h_2, qb4h_3, qb4h_4, qb4h_5, qb4h_6, qb4h_7, qb4h_8, qb4h_9, qb4h_10	$\alpha = .93$
Competence with social networking sites	qc1c_1, qc1c_2, qc1c_3, qc1c_4, qc1c_5, qc1c_6, qc1c_7	$\alpha = .93$
Competence with mobile phones	qc1e_1, qc1e_2, qc1e_3, qc1e_4, qc1e_5, qc1e_6	$\alpha = .88$
Competence with using ICT for study	qc1h_1, qc1h_2, qc1h_3, qc1h_4, qc1h_5, qc1h_6, qc1h_7, qc1h_8, qc1h_9, qc1h_10	$\alpha = .92$
Skill Levels with Interactive Technology	qc1a_1, qc1a_2, qc1a_3, qc1a_4, qc1a_5, qc1a_6, qc1a_8, qc1a_9	$\alpha = .88$
Competence with wikis, blogs and web 2.0	qc1d_1, qc1d_2, qc1d_3, qc1d_4, qc1d_5, qc1d_6, qc1d_7, qc1d_8, qc1d_9	$\alpha = .92$
Competence with basic work application	qc1f_1, qc1f_2, qc1f_3; qc1g_1, qc1g_2, qc1g_3	$\alpha = .86$
Ambivalence about the use of ICT at university	qd1_3, qd1_2, qd1_4	$\alpha = .68$
Attitudes to learning	qd5_1, qd5_2, qd5_3, qd5_4, qd5_5, qd5_6, qd5_7, qd5_8, qd5_9, qd5_10	$\alpha = .89$
Attitudes to gaming	qd5_11, qd5_12	$\alpha = .80$
Benefits of ICT	qd6_4, qd6_11, qd_14, qd_15, qd_16, qd_17, qd_18, qd_19, qd_20	$\alpha = .88$
Negative experience with ICT	qd6_6, qd_8, qd_9, qd_10, qd_13	$\alpha = .74$
Positive experience with ICT	qd6_1, qd6_2, qd6_3	$\alpha = .74$

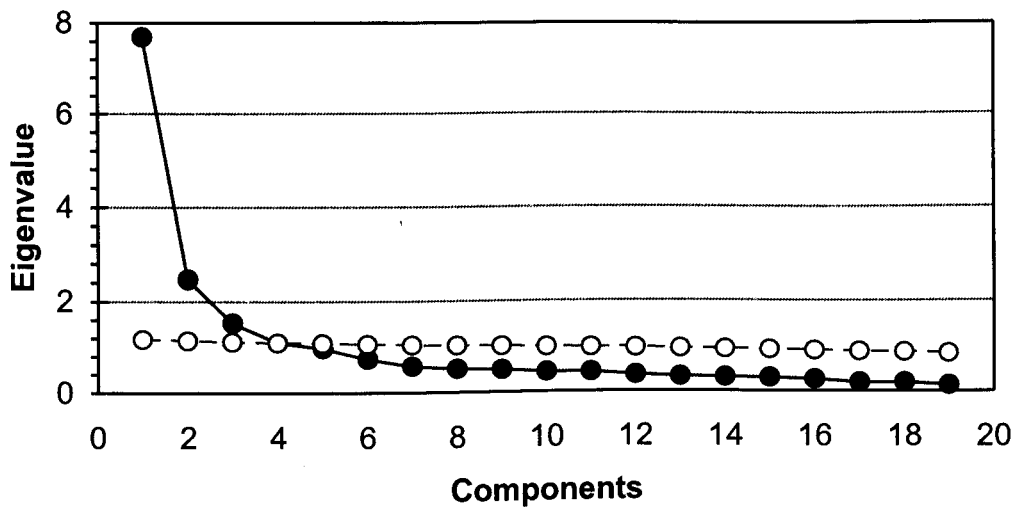
### 5.5.2 Second-order factor analysis

Following the first-order factor analyses, a second-order factor analysis was carried out on the scores obtained from the first-order factor-based scales in an aim to identify broader

dimensions of students' use of technology. Again, prior to performing principal component analysis the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Oklin value was .908, exceeding the recommended value of .6 (Kaiser, 1970, 1974) and the Barlett's Test of Sphericity (Bartlett, 1954) reached statistical significance ( $X^2 = 22923.748$ ,  $df = 171$ ,  $p < 0.001$ ), supporting the factorability of the correlation matrix.

A principal components analysis revealed the presence of four components eigenvalues greater than one, explaining 40.5%, 13.0%, 8.1%, and 5.8% of the variance respectively. However, an inspection of the scree plot revealed a break after the third component. Using Cattell's (1966) scree test, it was decided to retain three components for further investigation. The open circles in Figure 5.17 shows the results of a parallel analysis of 1000 random correlation matrices using the program written by O'Connor (2000). Only three components obtained eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix. This confirmed that three components should be extracted from the data set.

**Figure 5.17: Second Order Factor Analysis**



Principal axis factor analysis was thus used to extract three factors, with squared multiple correlation as initial communality estimates, and the extracted factor matrix was submitted to oblique rotation by the quartimin method.

The first factor showed salient loadings on the following items, and it was labelled **Use of ICT:**

Use of wikis, blogs and web 2.0 (.98)

Advanced use of applications technologies (.92)

Use of ICT for study (.87)

Use of social networking sites (.79)

Use of basic work applications software (.69)

Competence with blogging (.58)

Competence with advanced use of applications (.57)

Use of images (.50)

The second factor showed salient loadings on the following items, and it was labelled

**Attitudes towards ICT:**

Benefits of ICT (.85)

Usefulness of ICT for study (.69)

Positive experience with ICT (.63)

Negative experience with ICT (.47)

Competence with mobile phones (.45)

The third factor showed salient loadings on the following items, and it was labelled

**Competence with ICT:**

Competence with social networking sites (.66)

Competence with using ICT for study (.53)

Competence with basic work application (.52)

Competence with mobile phones (.49)

Competence with wikis, blogs and web 2.0 (.46)

Competence with advanced use of applications (.44)

The rotated solution exhibited 16 out of items that showed salient loadings. The 3 items that showed salient loadings on no factors are: Ambivalence about the use of ICT at university (.38); Usefulness of games and stimulations for study (.35); Use of mobile phones (.29).

Nevertheless, there were 3 items that showed salient loadings on more than one factors:

Competence with mobile phones, Competence with wikis, blogs and web 2.0, and

Competence with advanced use of applications. For the purpose of this study, items were

assigned to factors with the highest loading. Thus two items (Competence with wikis,

blogs and web 2.0, and Competence with advanced use of applications) were assigned to

factor (Use of ICT) reflecting different scales from those to which they had nominally been

assigned to (Competence with ICT). A reason for this discrepancy could be that student's

competency with wikis, blogs and web 2.0, and competence with advanced use of

applications were strongly correlated to their use of these applications. Alternatively,

another possible reason might be that when students were filling out the long

questionnaires, they provided unreliable answers related to this. When they were asked to

rate their self-perceived competences, they relied on their memory collection of frequency

of use. Both of these possible explanations need to be born in mind when interpreting the following results.

Second-order factor-based scales were constructed by computing the respondents' mean scores across the nineteen first-order factor-based scales. These scores showed satisfactory internal consistency as indicated by Cronbach's (1951) coefficient alpha: Use of Technology (Use of wikis, blogs and web 2.0, Advanced use of applications technologies, Use of ICT for study, Use of social networking sites, Use of basic work applications software, Competence with wikis, blogs and web 2.0, Competence with advanced use of applications, Use of images , $\alpha = .89$ ); Attitudes to Technology (Attitude to usefulness, Usefulness of ICT for study, Positive experience with ICT, Negative experience with ICT,  $\alpha = .76$ ); Skill Levels with Technology (Competence with social networking sites, Competence with using ICT for study, Competence with basic work application, Competence with mobile phones,  $\alpha = .82$ ).

### **5.5.3 Third-order factor analysis**

A third-order factor analysis was carried out on the scores obtained on the second-order factor-based scales to identify global dimensions of students' use of technology. Prior to performing principal component analysis the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Okin value was .648, exceeding the recommended value of .6 (Kaiser, 1970, 1974) and the Barlett's Test of Sphericity (Bartlett, 1954) reached statistical significance ( $X^2 = 1412.549$ ,  $df = 3$ ,  $p < 0.001$ ), supporting the factorability of the correlation matrix.



One principal component had an eigenvalue greater than one, and this explained 65.7% of the total variance. The idea that one factor should be extracted was confirmed by the scree test. Using the program written by O'Connor (2000), only one principal component obtained eigenvalue exceeding the corresponding criterion values for a randomly generated data matrix. Principal axis factoring was therefore used to extract just one factor with squared multiple correlations as initial estimates of communality.

The loadings of the second-order factor based scales on the extracted third-order factor were as follows, and it was labelled **Experience of ICT (Use of technology)**:

Skill levels with technology (.87)

Use of technology (.67)

Attitudes to technology (.60)

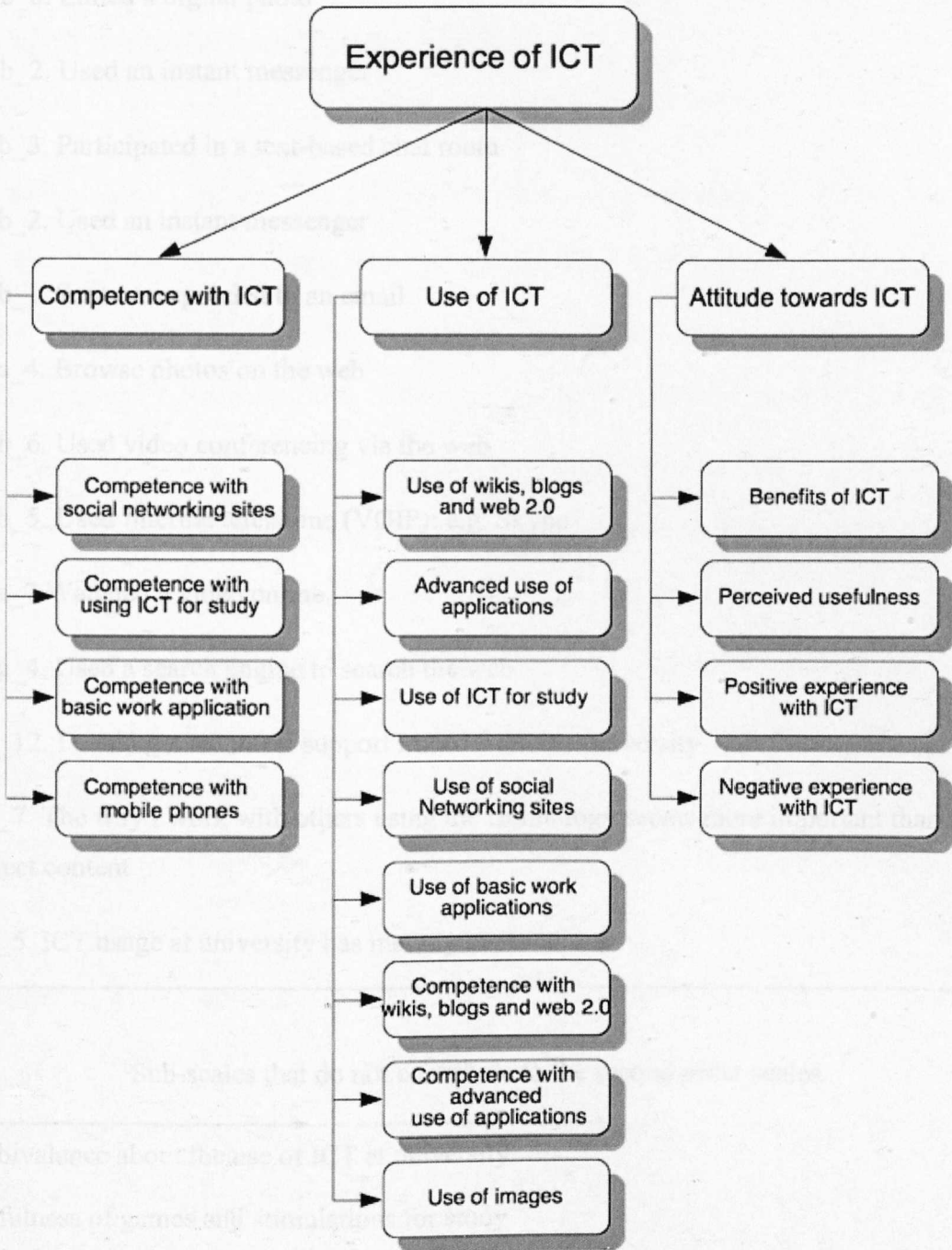
These loading suggest that students' use of technology was determined more by their skill levels with the technology and use of technology than by their attitudes to technology. The rotated factor solution resulted in a simple structure solution (a single high loading for each variable on only one factor), which matched the structure of the questionnaire, thus reinforced the validity of the instrument. More importantly, the simple structure of the third order factor analysis also strengthened the theoretical framework of investigating students' experience of ICT through their uses, skill levels and attitudes towards technologies.

#### **5.5.4 Summary**

Figure 5.18 below summarizes on the broad level the key themes generated from the three levels of factor analysis. As one can see the top level was students' experience of ICT,

which corresponds with our main research questions. On the second level was students' competence with ICT, use of ICT and attitudes towards ICT, which corresponds with the three main aspects of this research: students' use of, competence levels with and attitudes towards the use of technologies.

Figure 5.18 Relationship of scale orders



## Items that do not contribute to the higher order factors

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qb4f\_1. Played computer console or mobile phone games that don't require you to be connected to the Internet

qb4a\_1. Listen to an audio file (e.g. MP3) or a podcast

qb4b\_3. Participated in a text-based chat room

qb4b\_1. Sent or responded to an email

qb4b\_6. Edited a digital photo

qb4b\_2. Used an instant messenger

qc1b\_3. Participated in a text-based chat room

qc1b\_2. Used an instant messenger

qc1b\_1. Sent or responded to an email

qc1a\_4. Browse photos on the web

qc1b\_6. Used video conferencing via the web

qc1b\_5. Used Internet telephone (VOIP): e.g. Skype

qc1a\_7 Watched a video online

qc1g\_4. Used a search engine to search the web

qd6\_12. I could get technical support I need from the university

qd6\_7. The way I work with others using the technology seems more important than the subject content

qd6\_5. ICT usage at university has met my expectations

---

## Sub-scales that do not contribute to the second order scales

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Ambivalence about the use of ICT at university

Usefulness of games and stimulations for study

Use of mobile phones

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The point of factor analysis is to explain variability. There are two possible reasons why certain items did not load on any of the factors: either because almost everyone does it or barely anybody does it. Such items do not contribute to any variability. However it is worth noting that the analysis is based on the assumption that students filled out the questionnaire in a sensible way. No evidence has suggested that students did not fill it out in a sensible way.

## **5.7 Multivariate Analysis of Variance**

This section reports the results of a multivariate analysis of variance (MANOVA), which is particularly pertinent to answering research questions 3, 4, and 5: Is there any variation in students' use of technologies across disciplines? Is there any variation in students' use of technologies across years of study? Is there any gender difference in students' use of technologies? A MANOVA was used to determine whether students' self-reported use of ICT differed as they varied in Disciplines (electronics and information engineering, pre-school education, civil engineering, art and design, economics and management, Mechanics and Automation and foreign languages studies), Year of Study (first year, second year or third year), Gender (male or female) and age. Age was included as a covariate, whereas discipline, year and gender were independent variables. Because they are all included in the same analysis, the results tell us whether each had an effect on the scores when the effects of the other variables are statistically controlled. The MANOVA examined use of ICT, attitude to ICT and skill levels with ICT as dependent variables.

In order to reduce the probability of making Type I errors when large numbers of comparisons are being made, the probability level of 0.01 was employed as the criterion of statistical significance. As explained in section 4.7.1, partial eta squared was adopted as a

measure of effect size, and Cohen's benchmarks for small, medium and large effects (0.0099, 0.0588 and 0.1379) were used for explaining the effects. There were statistically significant different effects on the combined dependent variables ( Age: Wilks'  $\Lambda = .992$ ,  $F(3, 1959) = 5.384$ ,  $p = .001$ ; Discipline: Wilks'  $\Lambda = .961$ ,  $F(21, 5625) = 3.731$ ,  $p < .001$ ; Year of Study: Wilks'  $\Lambda = .934$ ,  $F(6, 3918) = 22.761$ ,  $p < .001$ ; Gender: Wilks'  $\Lambda = .989$ ,  $F(3, 1959) = 13.529$ ,  $p < .001$ ; interaction effect of Discipline and Year of Study: Wilks'  $\Lambda = .951$ ,  $F(42, 5812) = 2.376$ ,  $p < .001$ ; and interaction effect of Discipline and Gender: Wilks'  $\Lambda = .975$ ,  $F(21, 5625) = 2.388$ ,  $p < .001$ ). Wilks'  $\Lambda$  (Lambda) was used here as a complement of this measure (i.e. 1 minus it), which is the proportion of variance not explained by each independent variable. Univariate tests were then carried out to explore the origins of these effects.

### 5.7.1 Age

Age had a statistically significant effect on students' use of ICT ( $B = -.048$ ,  $F(1, 1961) = 7.334$ ,  $p = .007$ , partial  $\eta^2 = .004$ ). The younger the students were, the better access they tended to have with ICT.

**Use of ICT.** Univariate analyses on the individual sub-scales showed that variation with age in terms of use of ICT was associated with use of interactive technologies ( $B = -.062$ ,  $F(1, 1915) = 7.384$ ,  $p = .007$ , partial  $\eta^2 = .004$ ); use of office ( $B = -.066$ ,  $F(1, 1915) = 6.836$ ,  $p = .009$ , partial  $\eta^2 = .004$ ) and skill levels with interactive ( $B = -.059$ ,  $F(1, 1915) = 7.112$ ,  $p = .008$ , partial  $\eta^2 = .004$ ).

**Attitude to ICT.** MANOVA did not show any significant impact of age on attitude to ICT overall or any individual sub-scales.

**Skill levels with ICT.** Although MANOVA did not show any significant impact of age on skill levels with ICT overall, univariate analyses on the individual sub-scales showed that variation with age in terms of skill levels with ICT was associated with students' skill levels with office ( $B = -.080$ ,  $F(1, 1915) = 10.527$ ,  $p = .001$ , partial  $\eta^2 = .005$ ). The younger the students were, the better skill levels they tended to have with office.

**Other first order scales.** With regard to the sub-scales that are not part of the three main scales, again MANOVA did not show any significant impact of age.

**Summary.** MANOVA showed that age had a statistically significant effect on students' use of ICT. The younger the students were, the better access they tended to have with ICT. In particular, the younger the students were, the better access they tended to have with interactive technologies and office. Similarly, the younger the students were, the better skill levels they tended to have with office.

However, Cohen's (1988) recommended that proportions of explained variation of 0.0099, 0.0588 and 0.1379 respectively constitute small, medium and large effect. According to Cohen's (1988) recommendations, all of the effects reported above would be regarded as less than small, which means there was only a less than small proportion of variables could be explained by the effect. In other words, the effects of age on use of ICT were of little theoretical or practical importance. Furthermore, age did not show any statistically significant effect on students' attitude and skill levels with ICT. One reason for this could be the relatively narrow range of ages in the sample. In fact all the participants in the sample would be regarded as Digital Natives.

In the following results, variations in age have been statistically controlled. The mean scores reported in the following tables are the estimated means, controlling for the effects of age and the effects of the other independent variables.

### 5.7.2 Discipline

The first part of table 5.26 (appendix D) shows the mean scores for students in different disciplines. Discipline had a significant effect on use of ICT ( $F(7,1961) = 6.143, p < .001$ , partial  $\eta^2 = .021$ ) and skill levels to ICT ( $F(7,1961) = 3.865, p < .001$ , partial  $\eta^2 = .014$ ).

Students in Computing and Information Technology and Arts and Design tended to have the highest scores on access to ICT, whereas students in Education tended to have the lowest scores on access to ICT compared with other disciplines. In regard to students' skills with ICT, students in Arts and Design tended to have the highest scores, whereas students in Education tended to have the lowest scores, but the variation across disciplines was quite small.

**Use of ICT.** Univariate analyses on the individual sub-scales showed that the variation across disciplines in terms of use of ICT was associated with use of blogging ( $F(7, 1915) = 6.258, p < .001$ , partial  $\eta^2 = .022$ ); use of interactive technologies ( $F(7, 1915) = 5.659, p < .001$ , partial  $\eta^2 = .020$ ); use of learning ( $F(7, 1915) = 4.013, p < .001$ , partial  $\eta^2 = .014$ ); use of social networking ( $F(7, 1915) = 3.493, p = .001$ , partial  $\eta^2 = .013$ ); use of office ( $F(7, 1915) = 3.315, p < .002$ , partial  $\eta^2 = .012$ ); skill levels with blogging ( $F(7, 1915) = 5.934, p < .001$ , partial  $\eta^2 = .021$ ); skill levels with interactive technologies ( $F(7, 1915) = 3.445, p = .001$ , partial  $\eta^2 = .012$ ).

**Attitude to ICT.** MANOVA did not show any significant impact of discipline on attitude to ICT overall or any individual sub-scales.

**Skill levels with ICT.** Univariate analyses on the individual sub-scales showed that variation across disciplines in terms of skill levels with ICT was associated with skill levels with social networking ( $F(7, 1915) = 3.132, p < .01$ , partial  $\eta^2=.011$ ); Skill levels with learning technology ( $F(7, 1915) = 3.952, p < .001$ , partial  $\eta^2=.014$ ); and skill levels with office ( $F(7, 1915) = 4.736, p < .001$ , partial  $\eta^2=.017$ ).

**Other first order scales.** With regard to the individual sub-scales that were not part of the three main scales, univariate analyses showed that the variation across disciplines was also associated with attitude to gaming ( $F(7,1915) = 3.231, p = .002$ , partial  $\eta^2=.012$ ).

**Summary.** As could be seen from the results, discipline yielded larger effect sizes than age. In other words, discipline was a more important factor than age in this study. Discipline had a statistically significant effect on students' use of ICT and skill levels with ICT. According to Cohen's (1988) standard on size of effects, the effects on use of ICT and skill levels with ICT were larger than small. In other words, a larger than small proportion of variance could be explained by the effect of discipline on use of ICT and of the effect of discipline on skill levels with ICT. Both the effects were of larger than small practical importance.

Of the eight disciplines, students in Computing and Information Technology possessed both the highest access and skill levels with ICT, with students in Arts and Design followed close behind. In comparison, students in Education tended to have the lowest use of ICT and lowest skill levels with ICT. With regard to attitude to ICT, there was not much variance across disciplines, students in Arts and Design had the most positive attitude while students in Education had the lowest attitude towards ICT.



With regard to aspects of use of ICT, discipline had a significant effect on all aspects of access except use of digital photography. With regard to aspects of skill levels with ICT, variation across discipline was associated with skill levels with social networking, learning technology and office.

### 5.7.3 Year of study

The second part of table 5.26 (appendix D) showed the mean scores for students in different years of study. Year of study had a significant effect on use of ICT ( $F(2,1961) = 44.838, p < .001$ , partial  $\eta^2 = .044$ ). Students in the third year tended to score the highest on use of ICT with students in the first year score the lowest. In general, students' use of ICT increased as they went through university, with the largest increase between Year 1 and Year 2.

**Use of ICT.** Univariate analyses on the individual sub-scales showed that the variation across years of study in terms of use of ICT was associated with use of blogging ( $F(2, 1915) = 52.408, p < .001$ , partial  $\eta^2 = .052$ ); use of interactive technologies ( $F(2, 1915) = 68.603, p < .001$ , partial  $\eta^2 = .067$ ); use of learning ( $F(2, 1915) = 35.925, p < .001$ , partial  $\eta^2 = .036$ ); use of social networking ( $F(2, 1915) = 32.556, p < .001$ , partial  $\eta^2 = .033$ ); use of office ( $F(2, 1915) = 17.386, p < .001$ , partial  $\eta^2 = .018$ ); skill levels with blogging ( $F(2, 1915) = 12.111, p < .001$ , partial  $\eta^2 = .012$ ); skill levels with interactive technologies ( $F(2, 1915) = 15.838, p < .001$ , partial  $\eta^2 = .016$ ); use of digital photography ( $F(2,1915) = 6.287, p = .002$ , partial  $\eta^2 = .007$ ).

**Attitude to ICT.** Although the first MANOVA did not show any significant impact of year of study on attitude to ICT and skill levels with ICT, subsequent univariate tests on the 19

first order sub-scales showed that the variation across years of study was associated with attitude to usefulness ( $F(2, 1915) = 6.505, p = .002, \text{partial } \eta^2 = .007$ ).

**Skill levels with ICT.** Again, though the first MANOVA did not show any significant impact of year of study on attitude to ICT and skill levels with ICT, subsequent univariate tests on the 19 first order sub-scales showed that the variation across years of study was associated with skill levels with mobile phones ( $F(2, 1915) = 5.035, p = .007, \text{partial } \eta^2 = .005$ ).

**Other first order scales.** With regard to the sub-scales that are not part of the three main scales, again subsequent univariate tests on the 19 first order sub-scales showed that the variation across years of study was also associated with ambivalence ( $F(2, 1915) = 16.913, p < .001, \text{partial } \eta^2 = .017$ ).

**Summary.** The MANOVA showed that year of study had a significant effect on use of ICT, while no significant effect was found on attitude nor skill levels with ICT. As students went through university, their use of ICT increased, especially from first year to second year. However, according to Cohen's (1988) recommendation on size of effect, the effect of year of study on use of ICT was approaching medium. In other words, year of study had more theoretical and practical importance to use of ICT than age or discipline. Given that the effects of age and the other independent variables had already been controlled, one can tell that the effects of year of study were not due to the difference in the students' ages but were more likely to be due to differences in the curriculum.

With respects to use of ICT, there were statistical significant effects of year of study on all sub-scales of use of ICT. As students went through university, their use of blogging, interactive technologies, learning, social networking, office, photo, skill levels with

blogging and interactive technologies all increased. In particular, there was a bigger than medium sized effect on interactive technologies, which suggested that year of study had a particularly important effect on students' use of interactive technologies. Their use of interactive technologies increased significantly as they went through university. In comparison, the effect size of year of study on use of digital photography is less than small. In other words, the variance on use of digital photography was statistically significant but of little theoretical or practical importance. All the remaining sub-scales of use of ICT had larger than small effect sizes. That is to say, a larger than small proportions of variance could be explained by the effects.

#### 5.7.4 Gender

The third part of table 5.26 (appendix D) shows the mean scores for male and female students. Gender had a significant effect on students' use of ICT ( $F(1,1961) = 34.849$ ,  $p < .001$ , partial  $\eta^2 = .017$ ) and skill levels with ICT ( $F(1,1961) = 7.127$ ,  $p = .008$ , partial  $\eta^2 = .004$ ). In both cases, men tended to obtain higher scores than women.

**Use of ICT.** Univariate analyses on the individual sub-scales showed that the variation by gender in terms of use of ICT was associated with use of blogging ( $F(1, 1915) = 45.157$ ,  $p < .001$ , partial  $\eta^2 = .023$ ); use of interactive technologies ( $F(1, 1915) = 29.995$ ,  $p < .001$ , partial  $\eta^2 = .015$ ); use of learning ( $F(1, 1915) = 18.651$ ,  $p < .001$ ; partial  $\eta^2 = .010$ ); use of social networking ( $F(1, 1915) = 14.293$ ,  $p < .001$ ; partial  $\eta^2 = .007$ ); use of office ( $F(1, 1915) = 12.595$ ,  $p < .001$ , partial  $\eta^2 = .007$ ); skill levels with blogging ( $F(1, 1915) = 27.574$ ,  $p < .001$ ; partial  $\eta^2 = .014$ ); skill levels with interactive technologies ( $F(1, 1915) = 20.161$ ,  $p < .001$ , partial  $\eta^2 = .010$ ). In all these cases, men tended to have better access than women.

**Attitude to ICT.** Although the first MANOVA did not show any significant impact of gender on attitude to ICT, subsequent univariate tests on the 19 first order sub-scales showed that the variation by gender was also associated with negative attitude ( $F(1, 1915) = 7.624, p = .006, \text{partial } \eta^2 = .004$ ). Men tended to have more negative attitudes towards ICT than women.

**Skill levels with ICT.** The variation by gender in terms of skill levels with ICT was associated with skill levels with learning technology ( $F(1, 1915) = 9.453, p = .002, \text{partial } \eta^2 = .005$ ) and skill levels with office ( $F(1, 1915) = 37.890, p < .001, \text{partial } \eta^2 = .019$ ). In both cases, men tended to possess higher skill levels than women.

**Other first order scales.** With regard to the sub-scales that were not part of the three main scales, univariate tests on individual sub-scales showed that the variation across gender was also associated attitude to gaming ( $F(1, 1915) = 22.427, p < .001, \text{partial } \eta^2 = .012$ ). Men tended to have more positive attitudes to gaming than women.

**Summary.** The results showed that gender had significant effects on use of ICT and skill levels with ICT, but not on attitudes to ICT. Men tended to both better access and skill levels with ICT than women. According to Cohen's (1988) criteria, gender had a larger than small effect size on access and a less than small effect size on skill levels with ICT.

In terms of sub-scales of use of ICT, gender had a significant effect on all sub-scales of use of ICT other than use of digital photography. Men tended to have better access than women on use of blogging, use of interactive technologies, use of learning, use of social networking, use of Office, skill levels with blogging, and skill levels with interactive technologies. According to Cohen's (1988) criteria, there were bigger than small effects of

gender on use of blogging, use of interactive technologies and use of learning, which made them more attributable to gender than others.

In terms of sub-scales of skill levels with ICT, gender has a significant effect on skill levels with learning technology and office. In particular, gender showed a bigger than small effect size on skill levels with office, according to Cohen's (1988) criteria.

In terms of other sub-scales of students' self-reported use of ICT which were not part of the three main scales, gender showed a significant impact on attitude to gaming and it was of both theoretical and practical importance, based on Cohen's (1988) criteria.

#### **5.7.5 Discipline by year of study**

Table 5.24 below shows the significant effects for students taking disciplines in each year of study (for mean scores, please see Table 5.27 in appendix D). The interaction between the effects of discipline and year of study had a significant effect on use of ICT ( $F(14,1961) = 2.223, p=.006$ , partial  $\eta^2=.016$ ) and attitude to ICT ( $F(14,1961) = 2.440, p=.002$ , partial  $\eta^2=.017$ ).

Although the overall variation in use of ICT across different years of study was significant, students in different disciplines showed distinct patterns of change. For students in Electronics and Information Engineering, Computing and Information Technology, Mechanics and Automation, the major increase in use of ICT was between years one and two. For students in Civil Engineering, Economics and Management, Arts and Design, and Education, there was a further increase between years two and three. For students in Languages, there was a slight drop from year one to two, followed by an increase in year two to three.

Table 5.25 Tests of between-subjects for second order scales

	Use of ICT	Attitude to ICT	Skill levels with ICT
Age	** partial $\eta^2=.004$		
Discipline	*** partial $\eta^2=.021$		*** partial $\eta^2=.014$
Year of Study	*** partial $\eta^2=.044$		
Gender	*** partial $\eta^2=.017$		** partial $\eta^2=.004$
Discipline * Year of Study	** partial $\eta^2=.016$	** partial $\eta^2=.017$	
Discipline * Gender	*** partial $\eta^2=.016$		
Year of Study * Gender			
Discipline * Year of Study * Gender			

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

Overall students in different disciplines showed distinct patterns of change with regard to attitude to ICT. In particular, students in Computing and Information Technology and Arts and Design showed a significant decrease in attitudes to ICT from year two to three.

**Use of ICT.** Univariate analyses on the individual sub-scales showed that the variation by the interaction effects of discipline and year of study in terms of use of ICT was associated with use of blogging ( $F(14, 1915) = 3.274, p < .001$ , partial  $\eta^2=.023$ ); use of interactive technologies ( $F(14, 1915) = 3.274, p < .001$ , partial  $\eta^2=.026$ ); use of learning ( $F(14, 1915)$

= 2.832,  $p < .001$ , partial  $\eta^2 = .020$ ); use of office ( $F(14, 1915) = 2.092$ ,  $p = .010$ , partial  $\eta^2 = .015$ ).

**Attitude to ICT.** Variation by the interaction effects of discipline and year of study in terms of attitude to ICT was associated with attitude to usefulness ( $F(14, 1915) = 2.250$ ,  $p = .005$ , partial  $\eta^2 = .016$ ); attitude to learning ( $F(14, 1915) = 2.155$ ,  $p = .008$ , partial  $\eta^2 = .016$ ); positive attitude ( $F(14, 1915) = 1.827$ ,  $p = .030$ , partial  $\eta^2 = .013$ ); negative attitude ( $F(14, 1915) = 1.977$ ,  $p = .016$ , partial  $\eta^2 = .014$ ).

**Skill levels with ICT.** Though the first MANOVA did not show any significant impact of discipline by year of study on skill levels to ICT, subsequent univariate tests on the 19 first order sub-scales showed that the variation by the interaction effects of discipline and year of study was associated with skill levels with learning technology ( $F(14, 1915) = 1.714$ ,  $p = .047$ , partial  $\eta^2 = .012$ ); skill levels with mobile phones ( $F(14, 1915) = 2.071$ ,  $p = .011$ , partial  $\eta^2 = .015$ );

**Other first order scales.** Again, with regard to the sub-scales that are not part of the three main scales, though the first MANOVA did not show any significant impact of discipline by year of study on skill levels to ICT, subsequent univariate tests on the 19 first order sub-scales showed that the variation by the interaction effects of discipline and year of study was also associated with ambivalence ( $F(14, 1915) = 1.770$ ,  $p = .038$ , partial  $\eta^2 = .013$ ).

**Summary.** The MANOVA showed that the interaction effect of discipline by year of study had a significant effect on use of ICT and attitude to ICT. According to Cohen's (1988) criteria, the effect sizes were both small, which means only a small proportion of variance could be explained by the effect. In other words, the interaction effect of discipline by year of study on use of ICT and attitude to ICT was of small practical significance.

With respects to use of ICT, discipline by year of study had a statistically significant effect on use of blogging, use of interactive technologies, use of learning and use of office. All of these were of small practical significance according to Cohen’s (1988) criteria.

### 5.7.6 Discipline by gender

Table 5.25 showed the significant effects for men and women taking different disciplines (For mean scores, please see Table 5.28 in appendix D). The interaction of discipline and gender had a significant effect on use of ICT ( $F(7, 1961)= 4.524, p<.001$ , partial  $\eta^2=.016$ ).

Table 5.26 Tests of between-subjects for first order scales

*A (Age), D (Discipline), Y (Year of study). G (Gender); DY (Interactive effect of discipline and year of study), DG (Interactive effect of discipline and gender); YG (Interactive effect of year of study and gender); DYG (Interactive effect of discipline, year of study and gender).*

	A	D	Y	G	DY	DG	YG	DYG
<b>Use of ICT</b>								
Use of Blogging		*** partia 1 $\eta^2=.0$ 22	*** partia 1 $\eta^2=.0$ 52	*** partia 1 $\eta^2=.0$ 23	*** partial $\eta^2=.02$ 3	*** partia 1 $\eta^2=.0$ 16		
Use of Interactive	** partia 1 $\eta^2=.0$ 04	*** partia 1 $\eta^2=.0$ 20	*** partia 1 $\eta^2=.0$ 67	*** partia 1 $\eta^2=.0$ 15	*** partial $\eta^2=.02$ 6	*** partia 1 $\eta^2=.0$ 19		
Use of Learning		*** partia 1 $\eta^2=.0$ 14	*** partia 1 $\eta^2=.0$ 36	*** partia 1 $\eta^2=.0$ 10	*** partial $\eta^2=.02$ 0	*** partia 1 $\eta^2=.0$ 14		



	A	D	Y	G	DY	DG	YG	DYG
Use of Social Networking		*** partia 1 $\eta^2=.0$ 13	*** partia 1 $\eta^2=.0$ 33	*** partia 1 $\eta^2=.0$ 07				
Use of Office	** partia 1 $\eta^2=.0$ 04	** partia 1 $\eta^2=.0$ 12	*** partia 1 $\eta^2=.0$ 18	*** partia 1 $\eta^2=.0$ 07	** partial $\eta^2=.01$ 5	** partia 1 $\eta^2=.0$ 12		
Skill Levels with Blogging		*** partia 1 $\eta^2=.0$ 21	*** partia 1 $\eta^2=.0$ 12	*** partia 1 $\eta^2=.0$ 14				
Skill Levels with Interactive	** partia 1 $\eta^2=.0$ 04	** partia 1 $\eta^2=.0$ 12	*** partia 1 $\eta^2=.0$ 16	*** partia 1 $\eta^2=.0$ 10				
Use of Photo			** partia 1 $\eta^2=.0$ 07	** partia 1 $\eta^2=.0$ 03				
<b>Attitude to ICT</b>								
Attitude to Usefulness			** partia 1 $\eta^2=.0$ 07		** partial $\eta^2=.01$ 6			*
Attitude to Learning					** partial $\eta^2=.01$ 6			
Positive Attitude								
Negative Attitude				** partia 1 $\eta^2=.0$ 04				
<b>Skill Levels with ICT</b>								
Skill Levels with Social Networking								
Skill Levels with Learning		*** partia 1 $\eta^2=.0$ 14		** partia 1 $\eta^2=.0$ 05				

	A	D	Y	G	DY	DG	YG	DYG
Skill Levels with Office	*** partia 1 $\eta^2=.0$ 05	*** partia 1 $\eta^2=.0$ 17		*** partia 1 $\eta^2=.0$ 19				
Skill Levels with Mobile			** partia 1 $\eta^2=.0$ 05					
<b>Other first order scales</b>								
Use of Mobile								
Ambivalence			*** partia 1 $\eta^2=.0$ 17					
Attitude to gaming		** partia 1 $\eta^2=.0$ 12		*** partia 1 $\eta^2=.0$ 12				

\*\* p< 0.01; \*\*\* p<0.001

Post hoc tests showed that men obtained significantly higher scores than women on use of ICT in Civil Engineering, Languages, Economics and Management, Arts and Design, and Education. There was no significant gender difference on use of ICT in Electronics and Information Engineering, Computers and Information Technology, and Mechanics and Automation.

**Use of ICT.** Univariate analyses on the individual sub-scales showed that the variation by the interaction effects of discipline and gender in terms of use of ICT was associated with use of blogging ( $F(7, 1915) = 4.575, p < .001$ , partial  $\eta^2=.016$ ); use of interactive technologies ( $F(7, 1915) = 5.394, p < .001$ , partial  $\eta^2=.019$ ); use of learning ( $F(7, 1915) = 3.775, p < .001$ , partial  $\eta^2=.014$ ); use of social networking ( $F(7, 1915) = 2.555, p = .13$ , partial  $\eta^2=.009$ ); use of office ( $F(7, 1915) = 3.345, p = .002$ , partial  $\eta^2=.012$ ).

**Attitude to ICT.** Discipline by gender did not show any statistically significant effect on attitude to ICT or any of its sub-scales.

**Skill levels with ICT.** The first MANOVA did not show any significant impact of discipline by gender on students' skill levels with ICT. However, subsequent univariate tests on the 19 first order sub-scales showed that the variation by the interaction effects of discipline and gender was associated with skill levels with interactive technologies ( $F(7, 1915) = 2.070, p = .044, \text{partial } \eta^2 = .008$ ).

**Summary.** The interaction of discipline and gender had a statistically significant effect on use of ICT. In all disciplines where there was a significant variance (Civil Engineering, Languages, Economics and Management, Arts and Design, and Education), men tended to score higher than women on use of ICT. Even though, according to Cohen's (1988) recommendation on proportions of explained variation, the effect size was small. In other words, the practical importance of discipline by gender's effect on use of ICT was small.

Moreover, in all sub-scales of use of ICT where there was a statistically significant variance (use of blogging, use of interactive technologies, use of learning, use of social networking, use of office), men tended to score higher than women. This was compatible with the general trend in use of ICT.

Discipline by gender did not showed any statistical significant effect on attitude to ICT nor skill levels with ICT in general. However, there was a significant effect of discipline by gender on skill levels with interactive technologies and the effect size was larger than small.

### **5.7.7 Year of study by gender**

MANOVA did not show any significant impact of year of study by gender on students' use of ICT, attitude to ICT, skill levels with ICT, nor any of the sub-scales.

### **5.7.8 Discipline by year of study by gender**

The first MANOVA did not show any significant impact of discipline by year of study by gender on students' use of ICT, attitude to ICT, nor skill levels with ICT. However, subsequent MANOVA tests on the 19 first order sub-scales showed that the interaction effects of discipline, year of study and gender had a statistically significant effect on attitude to usefulness ( $F(14, 1915) = 2.084, p = .010, \text{partial } \eta^2 = .014$ ). According to Cohen's (1988) criteria, proportions of explained variation of 0.0099, 0.0588 and 0.1379 would constitute small, medium and large effects. Thus, though year of study by gender had a statistically significant effect on use of blogging, interactive technologies and office, the practical importance of these effects are not significant. According to Cohen's (1988) criteria .014 would constitute only a small effect. Thus, though discipline by year of study by gender had a statistically significant effect on attitude to usefulness, the practical importance of the effect was small.

## **5.8 Summary**

A total of 2920 students completed the survey, generating a response rate of 83%. A majority of the respondents spent less than three hours per day on a computer and most of them spent less than one hour. In general, students held positive attitudes toward the use of technologies at university.

In terms of technology ownership, only a moderate proportion of students had sole use of a personal computer/ or laptop. Mobile phone enjoyed a large popularity among students and was the form of technology most commonly owned amongst the respondents, though not yet universal. Almost all the students who owned a mobile phone would use it to call or send text on a daily basis. A high proportion of students (71.7%) also used their mobile phone to access the Internet, though only a small percent (43.3%) sent emails on mobile phones.

About 80% of the students listened to music and browsed photos on the Internet frequently. However, only a small percentage edited audio or video files on a computer. Even though, students were generally confident about their competence levels with watching, uploading or editing these image, audio or video files. With regard to gaming, mobile phone games enjoyed more popularity than online browser-based games and multiplayer video games.

Instant messaging was widely used among students with 78.6% used it on a daily basis. Social networking came second with almost 6 in 10 using SNS daily and 5 in 10 reading a blog daily. Though more than half of the students indicated that they were confident using emails (73.3%) and instant messaging service (65.6%), less than 30% of them were confident about using more advanced communicating tools, e.g. voice over IP, video conferencing and virtual worlds. While students were fairly confident about using SNS tools, less than half of them knew how to maintain or comment on blogs. In the case of more advanced web 2.0 technologies, e.g. social bookmarking, RSS feeds, file sharing and micro-blogging, only 2 or 3 in 10 indicated that they felt competent.

Search engines and word processing software were the basic work applications most often used by students. However, students' skill levels with these basic work applications were

not universally high. About half of the students needed assistance in using word, spreadsheet or presentation software. Only 50.6% of the respondents could competently use search engines on their own.

Overall, most students were enthusiastic about adopting ICT at university and appreciated the benefits ICT could bring to their earning and future jobs. 66.8% of the students would often use Internet to check for study related information. About half of them would get online to access course material or course-related information, e.g. notices, timetable. Nevertheless, not all of them were completely happy about the current university provision and would prefer it if the university would provide them more support in using these technologies.

Addressing research question 3, discipline had a significant effect on students' use of ICT and skill levels to ICT. Students in Computing and Information Technology possessed both the highest access and skill levels with ICT, with students in Arts and Design following close behind. In comparison, students in Education tended to have the lowest use of ICT and lowest skill levels with ICT. With regard to attitude to ICT, there was not much variance across disciplines. Students in Arts and Design had the most positive attitude while students in Education had the lowest attitude towards ICT.

MANOVA provided evidence to address research question 4 in that year of study had a significant effect on use of ICT, while no significant effect was found on attitude or skill levels with ICT. As students went through university, their use of ICT increased, especially from first year to second year.

To answer research question 5, quantitative evidence showed that gender had a significant effect on students' access and skill levels with ICT. Male students spent significantly

longer hours on ICT than female students and also showed higher self-perceived competence levels with ICT than female students.

In sum, the factor analysis explored the relationships between the scale items in the questionnaire. Furthermore, it also confirmed that the scale items in the questionnaire were measuring the dimensions of students' experience of ICT in terms of their use of ICT, competence levels with ICT and attitudes towards ICT. Statistical tests showed that age had a statistically significant effect on students' use of ICT, especially with regard to use of interactive technologies, office software and interactive technologies. The younger the students were, the better access they tended to have with ICT. The conclusions drawn as a result of the quantitative analyses will be further explored through qualitative analysis of the interviews with students as discussed in Chapter 6.

# Chapter 6 Qualitative Results

## 6.1 Introduction

This chapter presents the results and analysis of the qualitative data collected with 29 student participants. There were in total 13 group Interviews, conducted in small groups consisting of 2/3 students each. As mentioned in Chapter 4, the student interviews were first transcribed and translated, then the transcripts was analysed and colour-coded according to the emergent themes generated from back-and-forth reading and annotating the data. While the quantitative results sought to answer what technologies do students used, the qualitative results sought to answer how and why they used particular technologies. The qualitative results gained insights into students' attitudes, motivations and concerns regarding their use of technologies, as well as their behaviours, value systems, aspirations, even cultural backgrounds in relation to this.

Themes were generalized from the students' interviews and mapped in line with the research questions.

- How do students use today's technologies? (an overview of students' use of technologies by tools)?
- How do students use technologies for social and leisure purposes (specifically addressing research question 2)?
- How do students use technologies to support their learning (specifically addressing research question 3)?



- What do students think of these technologies (students' attitudes to the use of ICT at university)?
- Why do they use some specific tools more often than others (students' experience with specific tools)?
- How do their experiences with technologies change with years (year 1, year 2 and year 3 of study) (supportive evidence concerning research question 4)?

The interview results, together with student quotations, were organised and presented around these themes. However, it should be noted that only one or two quotations are presented for the purpose of illustration, even though the same point may have been repeatedly expressed by several other participants. Before discussing the main results, a list of participants is presented below:

Table 6.1 List of participants

Participant	Year of study	Discipline	Gender
A1	First Year	Education	Female
A2	First Year	Education	Female
B1	Third Year	Education	Female
B2	Third Year	Education	Female
B3	Third Year	Education	Female
C1	Second Year	Civil Engineering	Male
C2	Second Year	Civil Engineering	Male
C3	Second Year	Civil Engineering	Female
D1	First Year	Computing and Information Technology	Female
E1	First Year	Mechanics and Automation	Male
E2	First Year	Mechanics and Automation	Male
E3	First Year	Mechanics and Automation	Male
F1	First Year	Foreign Languages	Female
F2	Third Year	Foreign Languages	Female
F3	Third Year	Foreign Languages	Female
G1	Second Year	Economics and Management	Female
G2	Second Year	Economics and Management	Female
H1	Third Year	Computing and Information Technology	Male
H2	Third Year	Computing and Information Technology	Male
I1	Third Year	Economics and Management	Female
I2	Third Year	Economics and Management	Female
J1	Second Year	Mechanics and Automation	Male
J2	Second Year	Mechanics and Automation	Male
K1	Third Year	Civil Engineering	Male
K2	Third Year	Civil Engineering	Male
L1	Third Year	Mechanics and Automation	Male
L2	Third Year	Mechanics and Automation	Male
M1	First Year	Art and Design	Female
N1	First Year	Electronics and Information Engineering	Male

## **6.2 How do students' use today's technologies?**

The student interviews yielded rich qualitative data, providing an insight into how students are making use of today's technologies in a variety of different ways. Sections 6.2.1 to 6.2.5 report the results on the students' use of more traditional web 1.0 tools, including basic work applications, email, information searching, online news, and audio and video applications. Sections 6.2.6 to 6.2.9 report the results on other e-tools, including instant messaging, social networking, blogging and more recent web 2.0 technologies, e.g. micro-blogging, social bookmarking and RSS etc. Instant messaging is considered here because this study focused on instant messaging (IM) as part of a broader social network application (QQ). Finally, section 6.2.10 reports the results concerning the students' use of Internet on handheld devices.

### **6.2.1 Basic work applications**

Perhaps surprisingly, given the various technologies students used, not all of the students felt competent with basic work applications, e.g. Microsoft Word, Excel, PowerPoint, Outlook. The reason for this might be related to another finding from the interviews that the students were rarely requested to use these basic work applications for study. For example, the students were seldom asked to write their assignments in an electronic format, to use Outlook to check or /send emails, to check university notices, or prepare PowerPoint presentations as part of their course. As a result, there were a small number of students who did not even know how to use Word or PowerPoint. Even those who did know how to use these packages could only use the most basic functions. For advanced editing and collaborating etc, not all of them reported that they were competent.

‘I’ve learned how to use Excel before, but since I haven’t used it for a long time, I forget. In terms of Word, I can type, but I forget how to edit... I think for computer applications, you have to use it frequently. If you don’t practice, you’ll soon forget what you’ve learnt.’

(G1, Second Year, Business, Female)

Nevertheless a majority of students felt confident using these basic applications when occasionally required to do so.

‘I don’t have problems with using Word. I use it to make my CV, my friend send me his and it has the basic table format in it. I just changed my personal information, major etc. That’s easy... I am comfortable with using basic Word functions, such as making a table etc; however for things like programming, I can’t do.’

(F2, Third Year, Languages, Female)

### **6.2.2 Email**

Unlike in the United Kingdom and other European countries where email is dominant at universities, email was not frequently used among Chinese university students. Though many of the students had email accounts, they seldom used them, as there were not many occasions where the students were required to use email as part of their course, even though the university might sometimes use it for administrative purposes. The use of the Internet had not yet been fully built into the university’s study requirement.

B1: 'I don't use emails a lot. When the university sends out information, I go and check it in my email. The teacher sends me something and I send it back.'

(B1, Third Year, Education, Female)

Nevertheless, students rarely used email for social and leisure purposes either. Unlike instant messaging and social networking, there were not many students who relied on email to communicate with friends and family. Strangely enough, students would query why they needed emails, as there were many alternative communication tools available which seemed to be better and more effective, even though, compared with synchronous instant messaging services, asynchronous email services solved the problem of time differences in communication.

L2: 'Why do we need email? ...why don't you use QQ to chat? It's so much more convenient. You can send instant messages, we're here, unlike in companies or other more serious places where QQ is forbidden. We rarely use email, basically it's not of so much use at all, and it's just like a symbol. I have email box, but it's all empty.'

(L2, Third Year, Mechanical Engineering, Male)

As instant messaging and social networking attracts a larger user group, there would be less and less interest for students in using email unless there was a specific need for them to do so. Thus, to some extent, it could also be argued that Chinese students have bypassed email, whereas students in United Kingdom and other European countries linger on email because it is institutionalized. All of this raises the interesting question of whether Chinese students are in advance because of the lack of integration of email or behind and likely to arrive at the same use of email when computers and the Internet are integrated into studies. This will be discussed further in Chapter 7.

### 6.2.3 Information searching

The interviews showed that information searching was one of the most popular online activities among students. They relied on search engines to find all sorts of information, whether to address specific problems or a general opportunity to explore new knowledge. In particular, academic-related information searching has become an important part of students' online activity.

‘I spend most of my time online to chat or to search for study related information.’

(A2, First Year, Education, Female)

In term of search engine brands, the most popular brands were Baidu, Google, and Sogou. However, Google was not as widely used in China as would be expected in the west. Instead local Chinese search engines (e.g. Baidu and Sougou) seemed to be more popular.

‘I use Baidu, Sougou.’

(B3, Third Year, Education, Female)

‘I’ve never heard of Google’.

(G2, Second Year, Business, Female)

Most students had their own preferences in regard to which search engine to use, though some would turn to different brands for their specific purposes, depending on the task, speed of the network, link availability and reliability etc. For others, who did not have any particular preference, the reason for them to use a particular search engine was simple and straightforward: ‘I use whichever search engine came out on the computer’s homepage’.

‘There are two main search engines I use. If I’m looking for software and movies, I’d use Sougou or Gougou. For others, Baidu is more suitable for Chinese people, they use Google abroad. ’

(H2, Third Year, Computer Science, Male)

‘I often use Baidu. Now I find it not as easy to use as before, Google is not too bad. Sometimes you can’t get what you want from Baidu, for example Youku videos, you used to be able to watch, but not now. Maybe it’s because there’s too much pirates? Those on Google seems to be genuine copies. It has music, video, picture tabs on its homepage, I just use that.’

(K2, Third Year, Civil Engineering, Male)

‘It depends on what come out on the homepage, I’ll use Baidu if it’s Baidu; I’ll use Sougou if it’s Sougou. If neither come out, I’ll use others’.

(K1, Third Year, Civil Engineering, Male)

Nevertheless, there also existed a number of students who had limited knowledge of information searching. Inefficient search strategies had resulted in no information being found or, on the contrary an information overload.

‘Sometimes when you open up explorer, the home page is Baidu... I don’t know about other search engines and I don’t use them either... I can’t always get the information I want’

(B1, Third Year, Education, Female)

In general, their search strategies were rather simple. Students often turned to a particular search engine as their first step and relied greatly on the search engine brands to identify,

credible material simply through the ranking of the returned page via their preferred search engine. They regarded the search engine as the relevant means for evaluating credibility, rather than the result website itself. Similar findings have been reported by Hargittai *et al.* (2010) in the United States, and will be discussed further in Chapter 7.

‘I would only look the first few returned pages. The first two pages are the best, the further they are in position the lesser in quality, or materials of a long time ago which I wouldn’t use.’

(H1, Third Year, Computer Science, Male)

#### **6.2.4 Electronic news**

Reading online news was a popular activity among the students. They enjoyed reading the news and kept themselves updated with information both inside and outside of the campus. Compared with traditional newspapers, the students felt that online news was updated more quickly and covered a more comprehensive range, especially entertainment news.

‘I read news online. News online is comprehensive. I get online to read news once a month. News online is more comprehensive than newspaper, for newspaper I only check out Section A.’

(K1, Third Year, Civil Engineering, Male)

‘I sometimes read online news, sometimes not. Most of the time, I read entertainment news.’

(I1, Third Year, Business, Female)



An interesting point that emerged from the interviews was the mobile newspaper phenomenon. Since computer and /laptop ownership among students was not high, most of the students had to go to Internet cafés or /computer rooms to access the Internet and check out the news. As an alternative, a growing number of students subscribed to Mobile Newspaper (手机报; Pinyin: Shou Ji Bao), which is an electronic newspaper sent via mobile produced by the two largest mobile service providers in China - China Mobile and China Unicom. It costs 3 RMB a month (10 RMB is worth roughly the same as £1 sterling) and users get the latest news sent to their mobile phone twice a day. The students liked this service and felt it was very convenient. Moreover compared with the cost of going to Internet cafés at 1 RMB per hour, subscribing to a mobile newspaper worked out cheaper.

‘I read news on my mobile everyday. It’s very convenient. They send you different contents twice a day, all latest news. And the speed is fast. ’

(B2, Third Year, Education, Female)

### **6.2.5 Audio and video applications**

Listening to music or watching movies was one of students’ favourite online activities. For many, listening to music or watching movies was one of their most common leisure activities online. They enjoyed going online to look for new movies, music or videos fitting their interests, as they could choose to watch it whenever they wanted, plus it was often free.

Others who were more cost sensitive, would download the music/ or movie instead of watching it online. An example was given by two girls from the same dormitory who often

went to the Internet café in groups to download movies. They downloaded movies onto a USB memory stick and then transferred them onto the computer in their dormitory.

Those who did not own a personal computer/ or laptop, would most commonly download music or movies from the Internet and then watch them on their own MP3/4/5 player.

‘I download movie from the Internet and later watch it on my MP5.’

(B1, Third Year, Education, Female)

Comparing with listening to music and watching video files, more sophisticated media manipulation such as uploading and editing media files was used a lot less. Despite the wide popularity of listening to music or watching movies on computers, many of the students never actually uploaded audio or video files themselves. However the interviews showed that sophisticated media manipulation was not less frequent due to the students’ lacking the necessary computer skills; instead, the students said they had no interest or /motivation for doing so. Despite their low level of actual use, their self-perceived competence level was still high.

‘On the Internet, you can watch whichever movie you want whenever you want. You have the freedom comparing with traditional TV. On TV, you can only watch what’s been played and you can’t pause! However, I’ve never uploaded any videos myself. I’m not interested in this. Unlike some people I know, who enjoyed taking pictures or videos and then uploaded online, like you send videos on mobile. I’m just not interested in that. They have interests in that stuff, they think they take good pictures and share it with others. For us, we just interested in knowing what others same age people are doing, so we watch their pictures or movies, I think that’s it.’

(L2, Third Year, Mechanical Engineering, Male)

The students' attitudes to participation make an interesting contrast to the rhetoric around web 2.0, which is associated with web applications that facilitate participatory information sharing, interoperability, user-centered design and collaboration. This raises the interesting question whether Chinese students will change in the future or whether there is a cultural resistance to the participatory culture found in YouTube and Flickr which originate from the west. This will be discussed later in Chapter 7.

### **6.2.6 Instant messaging**

The student interviews showed that instant messaging, in particular the system integrated into QQ, was one of the most popular applications. As noted in Chapter 4 earlier, QQ in China has become more than a simple IM service, and has some of the functions of a social network site. QQ IM is really a part of a broader social network application (QQ).

However when the students mentioned QQ, they often referred to QQ IM, unless otherwise specified.

All of the interviewees had at least one QQ account, although their frequency of use varied from several times a day to once every few weeks. For many of the students, chatting with friends on QQ was one of their favourite online activities. Rather than using it as a way to getting to know new people, most students used it as another means of communication with their friends and family.

'I go online to chat with friends on QQ.'

(B1, Third Year, Education, Female)

As the mobile Internet had become more affordable, an increasing number of students had started to use QQ on their mobile phones. The students could easily download QQ software onto their mobile phones and many newer mobile models even had QQ pre-installed in the handset.

‘I use QQ on my mobile to chat’.

(H1, Third Year, Computer Science, Male)

Besides individual chatting, QQ also allows users to set up group chatting, and, perhaps specific to the Chinese context, QQ chatting groups were common among the students. They could freely join or create their own groups of interests, based on anything from games, cartoons, music to learning and study related questions. And, of course, chatting groups were often set up within an organization for better communication, for example, class groups. Almost everyone interviewed had joined a QQ group for their class. They sometimes also included tutors in the group, which provided an opportunity for them to chat with tutors in a more relaxed and informal way than in a face-to-face setting. However, instead of actually discussing course/study related issues in the group, the QQ groups were more often used as a notice-board for class information or as an address book for finding classmates.

‘I have 7 or 8 QQ groups. There’s a group for my high school class, a group for my high school, a group for this university, a group for my class, and a few more social groups, groups for friends, lots of different groups... For example, one of the instructors at this university organized a Confucius study group on QQ. I often get on that group, all people in that group is there to study Confucius, it teaches you how to be a good man,

how to do things properly. It's very good.'

(C1, Second Year, Civil Engineering, Male)

'We have a QQ group for my class and the tutor... We feel chatting with the tutor face-to-face intimidating, but on QQ, we feel like chatting with friends. We can say something on QQ with the tutor that we wouldn't feel comfortable talking about face-to-face.'

(A1, First Year, Education, Female)

Comparing QQ with MSN or other IM service produced elsewhere, it had gained popularity among students for simple reasons:

- QQ has better features and more functions. For instance, the QQ group function, where it is easy to find people with the same interests and get to know new friends, whereas on MSN, you can only chat to people you already know. In QQ you can leave messages for offline friends. You can also take pictures using a quick command and the screen capture quick edit option etc.
- Tencent QQ has the largest user group in China. For some, using QQ has the simplest explanation: 'most of my friends use QQ'. QQ, Twitter or any IM tools, are in the end social tools for communication among friends, and the group effect is the core to this battle. A similar effect is also evident between other competing social networking services.
- QQ is local software and has fewer system problems. Some of the features on QQ better suit the habits of Chinese users, and in addition it has more entertainment features.

### 6.2.7 Social networking sites

After instant messaging, social networking sites were another popular application among the students. A majority of the students used social networking sites frequently. Some even had more than one account with different social networking sites, including Xiaonei (also called Kaixin, Renren), Kuwo, 51.com, myspace etc. The most widely used site was Xiaonei, a famous Chinese social networking site which is similar to Facebook in the west, as described earlier in Chapter 3. Some would log onto Xiaonei to check out their friends' news every time they got online.

‘Almost everyone has a Xiaonei account. I log onto Xiaonei almost every time I got online.’

(F1, First Year, Languages, Female)

The students also used social networking sites to keep in contact with their friends and family. It was especially useful for re-connecting with old friends who were not studying in the same city or institution and with whom they had lost contact.

‘I use Xiaonei to look for classmates from high school. I prefer Xiaonei to 51, because in Xiaonei, if you click on your high school, you can actually find all your classmates. However, you can't do this on 51, you have to know the other's account to add him/her, or you have to click on their pages individually to see whether you know him/her or not.’

(I1, Third Year, Business, Female)

The most popular use of social networking was to check out their friends' profile and updates. While presenting themselves, the students enjoyed browsing other students' profiles. As with blogging, wiki, and other content uploading activities, the students tended to get resources from the Internet rather than actively contributing content to it.

'I often log onto QQ space to check out what my friends have been writing and sometimes give comments, though more of the time, I just view their entry without leaving any comments. I don't write very often on my own space.'

(D1, First Year, Computer Science, Female)

Besides checking out their friends' updates, some also enjoyed social networking sites because they provided a platform to present themselves, and to interact with friends. They enjoyed sharing their experiences and looked forward to receiving feedback from their friends. Most students expressed the opinion that receiving comments from friends encouraged them to write more. For example, one student often updated her status and liked the way that her friends left comments on it. Furthermore, instead of uploading pictures or /video to photo sharing sites like Flickr, the students were more inclined to upload photos to blogs and social networking sites.

'I like Xiaonei, because every time I can send a status update, then people give you comment and comfort you. It feels good. People left you messages, all good friends...I like it because people comment on it, and I wouldn't feel like writing if no one comments on it... I would update photos straight away as soon as it's been taken, so that people can see you are changing now and then...I would post diary when there's something unhappy, express my feeling when I feel frustrated.'

(F2, Third Year, Languages, Female)

There were also students who did not use social networking sites very often, but only occasionally logged in to check what was new and whether there were any messages for them. They only used these sites as a way to get contact information for old friends or school mates, but did not actually keep in contact very frequently. In the meantime, it is worth noting that the attractions of use of social networking had to some extent, lead students to overlook the pitfalls of these sites. The students viewed these sites as part of their social community, rather than as a public bulletin board with millions of other visitors. Only a few of them recognized that posting personal information could lead to identity theft, fraud, stalking or potential danger.

‘I don’t use Xiaonei very often, about once a month. I just log on to see if there’s any friend request or any message for me. It’s good to help me find friends that I’ve lost contact with. I search for them on Xiaonei, and then get their mobile numbers and QQ. That’s it, you don’t really contact often. I rarely write diary, there are only one or two pictures. I don’t play the games on there either. Most of the friends are my old school mates, hardly anymore unknown.’

(J1, Second Year, Mechanical Engineering, Male)

Finally, although social networking sites brought friends together and closer virtually, they still could not replace the feeling of physical contact.

‘I don’t know how others feel, but personally, I feel I have many friends in secondary school that I played a lot with, however, as we go to different universities in different places, we get kept away, though we can keep in touch on Xiaonei, it’s different. Only a few feel close.’

(J2, Second Year, Mechanical Engineering, Male)



Social networking sites possessed the characteristics of ‘communicating’ and ‘connecting’ desired by Internet service providers such as blogs and emails. They helped people to broaden their social networks and had become an increasingly important part of their Internet activities. While Facebook is undoubtedly the most widely used social networking site in western countries such as the United Kingdom, the United States and Australia, it has not acquired similar popularity in China. For social and political reasons, the Chinese government has banned Facebook access in most areas of China since 2009 (Wauters, Jul 7, 2009). Nevertheless, the main barrier for Facebook to compete in the Chinese market is the language barrier. As an alternative, local Chinese social networking sites have grown significantly in the last few years. Almost every student has a social networking site account, be it with Xiaonei, or QQ space etc.

### **6.2.8 Blogging**

Most of the students interviewed had used blogs for either leisure or learning purposes. Those who did not use blogs found themselves too busy to do so. They found using blogs time-consuming, as one would have to spend time maintaining and decorating their blogs. However, there were still students who had never used a blog because of their lack of computer competence. Just one interviewee told me that she had never used a blog because she did not know how to do so.

When asked what sort of content the students would normally write on their blog, their replies covered all kinds of areas including emotional, life related, study related, entertainment and news.

‘To express all sorts of feelings I had in mind, missed whom, but I wouldn’t tell the name. Mainly complaints about life, things I feel bad about... I update it whenever my emotion is there, when I feel like writing.’

(B2, Third Year, Education, Female)

While some students enjoyed writing online diaries and frequently updated their status, there were also others who were concerned about sharing their personal lives with others.

‘I seldom update my status, because I don’t want others to know about my life.’

(B2, Third Year, Education, Female)

Though not all of the students kept their own blogs, most of them found reading other’s blogs interesting.

‘I used to write online diaries when I was in first year, now I’m in third year. You have too many things to think about. You can’t calm down to write, and it’s too complicated... However I often read other’s spaces.’

(J1, Second Year, Mechanical Engineering, Male)

In summary, there is a popular blog culture among Chinese university students. Many of the students interviewed were frequent users of blogs, although they mainly used them for social and entertainment purposes, rather than for learning. Despite the vast majority of students who used blogs, there was still an example of one student who had never used a blog because of her lack of computer competence. This again illustrated that despite the generalized claims about Net Generation students’ natural competence with technologies; there were still students whose skill levels were lower than might be expected. A digital divide exists even within the same age group of students.

### 6.2.9 More recent web 2.0 applications

Most students who were interviewed had not used a wiki or Wikipedia before, though some of them were frequent users of Baidu-pedia, a local Chinese wiki service operated by Baidu. It provides similar services to Wikipedia, where people can freely edit information in an online database. Nevertheless, most students used Baidu-pedia mainly as a searching tool, a supplement to their standard webpage search. In other words, they only behaved as passive consumers of information rather than actively contributing content themselves.

‘I also use Baidu-pedia. I would normally go for WebPages first, if I can’t get the answer I want, I turn to Baidu-pedia.’

(H1, Third Year, Computer Science, Male)

As a relatively new web 2.0 service, micro-blogging allowed the users to publish instant messages. Twitter, for instance, was getting more and more popular in the west, and it could allow users to send message of up to 140 characters. Among its biggest advantages are its integration and openness; users can publish information via their mobile phone, IM software (Gtalk, MSN, QQ, Skype) and other external API sockets. However it is only recently that major Internet service providers started to promote micro-blogging in China with the advantage of an existing large user base, e.g. Sina micro-blogging, Sohu micro-blogging, Tencent micro-blogging, 163 micro-blogging etc. However it is still far from being well-known. Few of the students being interviewed knew about micro-blogging (Twitter).

‘We don’t use Twitter. It sounds like similar to QQ emotions, if you are unhappy today, you change your icon and status, but then a few days after when you are online again, you won’t be bothered to change it again. It’s not anything interesting or useful.’

Other web 2.0 applications, e.g. RSS readers, social book marking and pod casting services, were still in their early stages. Though more and more services had started to embody these features, they are used by only a very small fraction of early-adopters.

‘I’ve used QQ bookmarking, to kind of make a note of the good websites.’

(H2, Third Year, Computer Science, Male)

#### **6.2.10 Internet on handheld devices**

In contrast to the students’ low ownership of personal computers/laptop, they were increasingly using the Internet on their handheld device or mobile phones. 16 out of the 29 students being interviewed had accessed the Internet on their mobile phones. They used them to browse the Internet, log onto QQ, check out QQ space, read news, search for information, download pictures and music etc.

‘I most often used it to log on QQ, read news, and search for information. For example I use it to buy train tickets to go back home.’

(M1, First Year, Art and Design, Female)

Those who used the Internet on their mobile phone felt that it was convenient as they could be connected anytime, anywhere, without using a computer. Nevertheless, the mobile Internet also worked out cheaper than going to computer rooms to access Internet/ or to Internet cafés. For example they paid a monthly fee of 5 RMB for a 20 MB Internet

allowance on mobile phones, whereas going to computer room/ or Internet café would have cost 1-1.5 RMB per hour.

‘It’s convenient, I can use it whenever I want, and I do not need to go to the computer rooms any more’.

(A2, First Year, Education, Female)

For others who didn’t use the Internet on their mobile, there were various reasons preventing them from accessing the Internet. Chief among these were cost concerns, perceived lack of benefits and handset limitations. For instance, D1 (First Year, Computer Science, Female) thought it was too time consuming to access the Internet on her mobile phone; she always wanted to check her QQ or browse the Internet, even during class hours. Thus she decided not to have mobile Internet access anymore. In contrast, C1 (Second Year, Civil Engineering, Male) used to have a mobile phone which he could use to browse the Internet; however, since he had broken the mobile, his new phone did not offer this function. Apart from mobile function limitations, there were also other practical reasons, e.g. battery life, or slow network connection, which would be worth attention from mobile phone manufacturing companies in the future.

‘I used to use mobile Internet but not anymore, browsing Internet on mobile consumes the battery too quickly’.

(F2, Third Year, Languages, Female)

## **6.3 What tools are students using to support their social and leisure activities?**

In response to research question 2, ‘What technologies do students use for social and leisure purposes?’, this section addresses the students’ use of technologies in relation to their social and leisure activities, while section 6.3 will address the use of technologies to support learning. However, it is worth noting that there is no clear distinction between using technology for social life and for learning, as they sometimes interact with each other.

### **6.3.1 Mobile phone**

The quantitative data showed that mobile phones were one of the tools most frequently used by students: 9 out of 10 used mobile phones on a daily basis. Looking deeper into the context the interviews showed that most of their mobile phone activities were for social and communication purposes rather than for learning.

As students relied on their mobile phones to keep in touch, contact and share information with each other, sending/receiving text messages and making/receiving phone calls were two of the most common applications. However, apart from general communication purposes, students largely sent text messages for leisure purposes. Typical examples include sending holiday greetings, exchanging gossip and sharing jokes.

‘I often send texts jokes to my friends, exchange funny messages, or simply there’s any gossip to talk about’.

Besides making phone calls and sending text messages, a large number of students enjoyed using their mobiles to take pictures and listen to music. Compared with stand-alone digital cameras or MP3 players, mobile phones are more multi-functional while portable.

Although the quality might not be as good as that of dedicated cameras or MP3 players, most of today's mobile phones provided sufficient quality for the students' basic needs.

'I use my mobile phone to listen to music. Songs in my phone were either downloaded or sent by friends... I also use my phone to take pictures. I either store the pictures in my phone or upload them onto my space. It's very convenient'.

(D1, First Year, Computer Science, Female)

When asked whether they used their mobiles to discuss any learning/ or subject questions, the students said that they did not usually discuss subject matters over the phone. This was mainly due to the general university setting in China. The campus was relatively compact in contrast to some western universities where several campuses are scattered over a city. It was a university rule that most students lived on campus where everyone was physically close to each other. Given the large Chinese population and limited geographical space, it is not hard to understand that in a typical dormitory setting there were six students sharing three bunk beds. Since students could easily meet each other face-to-face, there was no need for them to discuss this over the phone. They felt that learning/ and subject matter were better discussed face-to face than over the phone.

'We don't discuss assignments via mobile phones; we discuss them in the dormitory'.

(B3, Third Year, Education, Female)

Though students did not use mobile phones to discuss any direct learning/ or subject questions, they did use them to discuss course related issues. For example, they would send texts to friends to find out information about their assignments or course time etc, or they would send texts to encourage each other during exam terms.

‘I would send texts to my classmate to find out what was the assignment, what was the teacher’s requirement etc, when I was at home’.

(B2, Third Year, Education, Female)

### **6.3.2 Computers and the Internet for social and entertainment purposes**

Rather than using computers and the Internet to facilitate daily work and study, students mostly used the Internet for social and entertainment purposes. They most widely used Internet applications were watching movies, chatting and browsing QQ space, and reading news, for anything but not for academic study.

‘Using Internet has gradually become a way of entertainment among us students’.

(C1, Second Year, Civil Engineering, Male)

‘Watch moves, listen to music, browse webpage, and play games.’

(N1, First Year, Electronics and Information Engineering, Male)

In some disciplines, where students were required to use computers and the Internet to prepare assignments, they often just did what they were instructed to do rather than taking any initiatives to use the Internet. A common perception among students towards the



Internet was that it would often distract them from study, rather than helping them with their work.

G1: 'Using computer to type and print out assignment is a course requirement. We have to use it, but nothing more'.

G2: 'We wouldn't study when we were given books, not to mention if we were given computers, won't study at all. '

G1: 'Would play harder.'

(G1, G2, Second Year, Business, Female)

### **6.3.3 Instant messaging**

Students were frequent users of instant messaging services; however, most of them used these for social and entertainment purposes rather than for study. When asked whether students would chat about course matters over IM, the answer was negative. Most students did not use instant messaging to communicate with friends on their subject matter or to ask their teachers. Even if they did have questions on the subject matters, they would resort to friends and classmates and resolve them offline.

'Let me put it this way, my major is Mechanical engineering, if it's study related questions, it must be too complicated to chat online'.

(J2, Second Year, Mechanical Engineering, Male)

While a large number of students used instant messaging, few used it for study purposes. IM was primarily used as a social device. Furthermore, their use of technological devices for social and entertainment purposes did not mean that they would necessarily transfer

these behaviours to the learning context. The interviews showed that one cannot assume there is any direct transfer of technology experience to study contexts and learning preferences.

#### **6.3.4 Gaming**

Contrary to the image of the ‘Net Generation’, games did not play a central part in students’ daily activities. Those who played computer games were still a minority. Some students regarded playing games as one of their favourite hobbies and spent hours playing games on a daily basis, though the majority were not fans of computer video games.

‘I use computer to play games, like counter strike.’

(J1, Second Year, Mechanical Engineering, Male)

Some did not play computer video games for financial reasons. Those who did not have their own computers or laptop would need to pay to go to an Internet café to play games, and this was expensive.

‘I don’t play computer games. I don’t go out to play at all, but I would watch friend playing games and when they asked me to try out, I would play for a while on their computer, I think it’s interesting. I don’t play because I am afraid of getting addicted to games, I don’t want to spend money.’

(K2, Third Year, Civil Engineering, Male)

The majority of the students was aware of the existence of computer games and had tried them for themselves. However, they were not addicted to games at all: they might play occasionally but would soon get bored.

‘I don’t play games. I used to play Huang Quan, but nothing else. There are not many of us who play computer games, there’s just one who play online games, very few others, offline computer games at most.’

(L2, Third Year, Mechanical Engineering, Male)

Besides computer video games, browser-based games on social networks had become increasingly popular. As another form of games, free browser-based social games had attracted more and more users recently. These were different from stand-alone computer video games in that, users played with or against real people in their social network. Like Farmville, Mafla Wars, and Vampires Live on Facebook, there were also many popular social games on Chinese social networking sites. For example, there was a Chinese farming game similar to Farmville that allowed players to control a virtual dairy farm by planting, growing and harvesting virtual crops, trees and livestock. It had become popular since it was made available on Xiaonei and had attracted a large gaming community. Many students became addicted to the game and had to check social networking sites frequently just to see the updates of their virtual farm.

‘I play Xiaonei games whenever I feel bored. I wasn’t playing till my friends introduced me to the game, now I’m addicted.’

(C3, Second Year, Civil Engineering, Female)

In general, however, contrary to the claims being made regarding Net Generation users (Prensky, 2001), the results showed that gaming was not a major phenomenon among

Chinese university students. Those who frequently played computer video games were only a small minority.

## **6.4 What tools are students using to support learning?**

Following section 6.3 this section addresses students' use of technologies for learning purposes, in response to research question 3, 'What technologies do students use to support their learning?'

### **6.4.1 Computers and the Internet**

Though the Internet was regarded by most students as a means for socializing and entertainment, it was still used by many as a useful tool to acquire new information and increase their work efficiency (for example, in writing dissertations, or searching for information, and particularly, for senior students in job hunting)..

'I don't go online very often, only a couple of hours every week, when there's something I need to do online. For example, if there are any questions I don't understand, or if I want to search for anything, I would get online.'

(H2, Third Year, Computer Science, Male)

'I used to use computer to chat, or write blogs, but now I use it to look for jobs.'

(F2, Third Year, Languages, Female)

Perhaps interestingly, this was particularly the case for those who had bought their own laptops. Compared with those who went to university computer rooms or Internet cafés to access a computer, those who owned personal computers or /laptops seem to have used the computer more for work. This may be because those who owned their personal computer had more experience with computers and the Internet, and thus they had passed the period of being curious about the Internet and were more resistant to the various attractions that it offered.

‘The reason I bought the laptop was to download documents, that’s all I do with computer now, I don’t play games any more, rarely do.’

(L2, Third Year, Mechanical engineering, Male)

In general, most students used the computer to listen to music, watch movies, play games, and chat, and only a few used it to help with their studies. This had not been built into coursework: students’ uses of computers to support academic study was generally lower than for social and entertainment purposes. Nor had this become part of their personal study methods. There was no transfer from students’ extensive computer experience to using computers for academic purposes.

#### **6.4.2 Emails**

Unlike their’ vast use of instant messaging for social and leisure, purposes, the students mainly used emails to support their academic study, e.g. submitting assignments, and to communicate with teachers on course-related questions.

‘For example last year when the final exam is approaching, teacher send us practice questions to our email box and let us finish, if there’s anything we don’t understand, we send back and he take a look. I think it’s very useful. University lectures are not always on campus any way, there’s a period when exam is approaching, we do exercises on our own, if there’s anything we don’t understand, and we can only get in contact with the teacher via mobile or email. It’s not convenient to send questions, or figures via mobile phone, so we have to use emails.’

(C1, Second Year, Civil Engineering, Male)

However, compared with western and advanced industrial countries, emails were used much less or, in other words, were not widely required as part of a course. The majority of assignments were hand written. Only for some specific courses were, students occasionally asked to submit their assignments electronically via email.

Since the use of email was not universal among students, some teachers had also set up a class email account so that all the students in the class could share one email account. For example,

‘We have a communal email box, when the teacher sends out courseware, he/she sends it to this box, and so that we can all get access.’

(B3, Third Year, Education, Female)

Besides supporting academic study, students frequently used emails when they were in their third year, when they started to look for jobs. As they were preparing themselves for the job market, they found emails useful in presenting themselves professionally to potential employers.

‘My email is now used to send CVs, companies ask me to send my CV to them as attachments, with my photo on it... I use QQ email occasionally; I used it to send over edited CV.’

### **6.4.3 Multimedia courseware**

To comply with the university’s policy, many teachers used multimedia courseware in their lectures, mostly PowerPoint slides, audio and video files. Though this was just a very basic use, most students found the way that teachers used PowerPoint in their classes useful.

‘I think multimedia courseware is useful. For example, for abstract concepts, you can’t fully understand if only given verbal description; however, if you use multimedia teaching, with pictures, videos and some information searched online, it’s much easier to understand and remember, it can also create a deeper impression’.

(C2, Second Year, Civil Engineering, Male)

Sometimes, when students found teacher’s PowerPoint presentations useful, they would copy the courseware onto their memory sticks after class from the teacher’s computer, and would review the material themselves in the computer room.

‘Sometimes, I would copy, but rarely. For example, like before the recent exam, many people copy the teacher’s files and then review it themselves afterwards.’

(G1, Second Year, Business, Female)

However, others did not find the PowerPoints useful, because they felt that most of the contents could be found in books.

‘So so, I don’t think it’s useful. You can find it from the books anyway. I won’t copy the ppt after class.’

(G2, Second Year, Business, Female)

As shown from the interviews, though the level of application of multimedia resources in classrooms was high, the degree of implementation was low. The teachers’ use of electronic resources was only at the basic levels: PowerPoint slides, multimedia resources, online information etc. There was no systematic course management system (CMS) of the sort used in advanced western industrial countries. Teaching instruction was conducted with the aid of multimedia resources, but afterwards, class discussions, homework submission and exams were still implemented in a traditional way.

#### **6.4.4 Learning English**

Although most students often used computers to browse the Internet, few read any English websites, nor had they searched for information in English. Many of the students had problems reading English websites, which undoubtedly limited their scope of information. Occasionally, some students would go online and search for English listening material for TEL4 or TEL6 (national levels of English language Test: students are required to pass TEL4 to graduate from university), and then download the material as listening practice.

‘I rarely browse English websites. However sometimes I would use it to listen to VOA, BBC broadcast... When we were writing dissertations, the professor recommended a website, I forget the name of the website, but that’s a good one. Some of my classmates would use it to get information when writing dissertation.’

(F2, Third Year, Languages, Female)



‘I can’t understand English website, but sometimes I download English songs and listen.’

(J1, Second Year, Mechanical Engineering, Male)

However, the Internet provided students with an open platform and much more could be done to help students to improve their English language proficiency. For those who were willing to learn English, the Internet provided many opportunities. For example, a few students said that they read English articles, downloaded information about English learning, listened to English radio stations and, English songs, even watched English movies etc. Moreover, most students found online translating sites and software (for instance, iciba or Google translate) useful in helping them read English articles.

‘I use Google translate to translate foreign articles.’

(H2, Third Year, Computer Science, Male)

‘I think be able to get online is very useful for my English study. I could install ICIBA dictionary if I have my own laptop.’

(K2, Third Year, Civil Engineering, Male)

#### **6.4.5 Acquiring new skills**

One of the claims made about the Net Generation was that the way they learned has changed in such a technology-driven world. Thus one of the questions asked in students’ interviews were about how they had adopted new ICT skills. It is evident from the interviews that most students had acquired their ICT skills by themselves rather than being

taught by their teachers. If there was any programme that they did not know how to use, they would often learn it by themselves or ask their friends for help instead of asking for help from their teachers. The reasons for this varied. Some felt that their teachers might not know the answer either since it was outside the curriculum. Others simply felt embarrassed to ask their teachers questions. Most students had little contact with the teachers after class. Nevertheless, most students felt confident that they could acquire the skills when they needed them.

L1: 'Teacher never taught us how to use online applications, they just teach what's on the text book, basic program, command etc. We learnt Excel since junior school, and now I even forget how to send and receive emails...If there's anything I find useful, I would learn it myself. '

L2: (commenting on L1) 'The teacher points you the way, and it's yourself who follow it.'

(L1, L2, Third Year, Mechanical Engineering, Male)

The students were not naturally born with ICT skills. If there was any technology or application they did not know how to use, they would often first try to solve the problem themselves by exploring, before observing how others had done it. In most cases, by trying out this and that, they could often quickly understand the new ICT. Immersed in a technology-rich environment, surrounded by peers using various applications, students were often implicitly exposed to new technologies. When later on, they themselves faced similar problems, they could often quickly draw information from their memory, and grasp the skills with a bit of practice.

‘If there’s any programme that I don’t know how to use, I explore it... by trying this and trying that forth and backwards, I try out anything I don’t know how to use, then after a while, I would get it... I’ve self-learned how to surf the net, chatting, watching news etc.’

(B3, Third Year, Education, Female)

Living together, there was a large student community on campus. With 6 to 8 people sharing a dormitory, information would spread quickly. The easiest way to learn something was to ask friends around. If anyone needed help on a particular programme, there was always someone around to ask. The community of peers became the biggest information source from which students could learn.

‘I learnt most of my ICT skills from friends. They know how to do it and teach me.

Then I teach others, one by one. ’

(G1, Second Year, Business, Female)

However, if they could not resolve their problems, the students would resort to books, videos, and particularly other online information. Many students searched online for the information they needed. Instead of searching for pure text files, an increasing number of students preferred video clips. The interviewees said that they enjoyed learning from online videos, because they could play the videos again and again and watch how others had solved a problem step by step.

‘If I still can’t get it after playing around with it, I would get online and search for some relevant videos clips. There’s lot of videos like that from Baidu or Tudou etc.’

(K2, Third Year, Civil Engineering, Male)

Despite the various claims about the Net Generation, books were still one of the most frequently used sources of information among students. If there was anything they needed, books were still the first point of call for many of the students.

F2: 'I borrowed friend's books on Photoshop and quickly browsed it. It's quite simple, I just use it to edit my own photos, edit lips, brow shapes etc. very simple.'

F3 :( commenting on F2) 'You play with it yourself first and then if there's still anything you don't understand, check it from the book.'

(F2, F3, Third Year, Languages, Female)

## **6.5 What do students think of these technologies?**

As one of the research aims for this study was to explore students' attitudes towards the use of technologies at university, this section reports the results on what students think about these tools in response to research question 4.

### **6.5.1 Attitudes towards mobile phones**

Despite the various functions available on today's mobile phones, most students held traditional attitudes to mobile phones. No matter what else has become available, the single most important role of mobile phones was as a communication tool.

'Let's say mobile phones. I think the most important character of mobile phones is a communication tool. Personally, one of my deepest feeling is, mobiles today have too many functions, especially for young people like us who enjoys mobile phones with lots

of functions. However, I don't think it's necessary at all. Because the battery size is limited, the more functions you use, the quicker the battery consumes. If there's any urgent matter, and your battery run out because you played too much, it's very annoying. You can't get in contact with other people, and others can't get hold of you. It causes unnecessary problem. Phones with the most initial communication function will do... Nevertheless, I would not intentionally deny any new things, for example, listening to music. If anyone recommends any new song and I like it, I would listen. Most cases, I would use my mobile to read e-books and listen to music, I rarely watch movies on mobiles, the rest is just to make calls. '

(L1, Third Year, Mechanical Engineering, Male)

In order to illustrate the importance of ICTs in their daily activities, the students were asked what would happen if different devices were taken away for a few days. Out of all devices, the loss of mobile phones seemed to concern them the most.

For most of the students, mobile phones were regarded as a necessity and served a key role in their contacts with the outside world. They would prefer to keep their mobiles with them at all times, as B1 remarked:

'If my mobile runs out of credit, I top it up immediately.'

(B1, Third Year, Education, Female)

'It would make a big impact to us if you take away mobiles, it would literally cut off all our contacts... for example, between friends, we would often use mobile to call and ask where they are, without mobile phones, it would be difficult to find each other.'

(B3, Third Year, Education, Female)

## 6.5.2 Attitudes towards computers and the Internet

Despite the claims made about the Net Generation, university students in China did not appear to have a natural aptitude and competence with technology. For some students, computers and the Internet only entered their lives when they were teenagers, and the traditional idea of reading and writing using pen and paper still had a strong influence on their mind. Compared with new digital information, traditional sources of information, such as books, still occupied the top place. E-book readers such as Kindle, Nook Tablet etc, were rarely available to the respondents. For example, when asked whether they thought there was more information on the Internet than in books, C1 replied,

‘I think we’ve formed a habit to read books, since when we’re small. If there’s something I can find from books, I’ll read books, if there’s anything I can’t find from books, I would go online and search.’

(C1, Second Year, Civil Engineering, Male)

It was suggested from the interviews that the use of computers and the Internet was only a small part of the student’s diversified lives. Especially for those who did not need to use computers and the Internet for their disciplinary studies, rather than spending hour after hour on the Internet, many would prefer to spend time going out with friends, attending social meetings or, club activities, or being active in sports games. Spending time on the Internet was regarded as one of the many means to spend their leisure time. As well as spending time on line for social and entertainment purposes, these young people were also active in traditional face-to-face social and leisure activities ‘offline’.

Nevertheless, all students held positive attitudes towards computers and the Internet no matter what level of access they had to computers and the Internet and the various ways that they made use of them, whether for leisure or study purposes. Even those who mainly used computers for social and leisure purposes regarded the technology as useful for work and study in the future. Furthermore, their opinions regarding the use of technology to help with university study were universally positive despite the relatively low levels of current usage. Perhaps interestingly, their attitudes towards technology did not necessarily correspond to their confidence level or actual usage.

### **6.5.3 Computers as a subject of study instead of daily tools**

Many of the students interviewed only started to use computers when they were in secondary school. Since the late 1990s, the Chinese government has published a series of government reports to encourage the implementation of computer literacy education in Chinese primary and secondary schools. By the end of 2000, more than 60000 schools had successfully provided computer lessons to their students (Gsres Press, 2008). For many, the computer was regarded as a subject of study rather than a tool for daily use.

‘We did have computer lessons in secondary school, but just courses, nothing else. I don’t often use the computer or get online when in secondary school’.

(D1, First Year, Computer Science, Female)

Many of secondary schools only provided computer lessons to their students as required by the national curriculum. For their students, the aim of computer lessons was even simpler, to pass the exams.

‘We did have computer lessons, but just for the exams. We learn what will be covered in the exams, and the main aim was to pass exams.’

(A2, First Year, Education, Female)

As a consequence, students had little opportunity to practice and process the information they had learned on computers. They had rarely truly mastered the computer skills they had been taught, although they themselves thought that the experience had been useful.

B2: ‘Stuff I’ve learned in the computer lesson is useful, but not any more.’

B1: ‘We forget.’

B2: ‘Yes.’

B3: ‘Because we don’t have much opportunity to practice.’

(B1, B2, B3, Third Year, Education, Female)

Unfortunately, although university was a huge improvement in general, many still experienced the same problem. Although computers and the Internet literacy was one of the compulsory courses at university, there were still students who felt that the university had not provided enough training and practice opportunities. From the student interviews, they expressed a strong demand for better institutional provision in terms of computers and the Internet training and professional helps. In the first-year computer program, for example, students had both theory and practice lessons. Practice lessons were once a week, each lasting two hours. When asked whether students thought the lessons were enough for their needs, they noted:

‘Of course not, like when we learnt Photoshop and making web pages, there were only a few lessons, just for exams.’



## **6.6 Why they are using specific e-tools? What makes them use some of the tools more often than others?**

Why do students choose to use a particular e-tool instead of others, what is their thinking process and what are their considerations? Knowing that would help technology designers to design better tools, teachers to better implement the use of technology into their courses, and universities to provide better technological provision and learning environments. With that aim, this section reports the results on students' responses to their reasons for using particular technologies.

### **6.6.1 Finance concerns: choosing between calls and texts**

An emerging theme from the students' interviews regarding their use of mobile phones was the issue of cost. Many of their decisions concerning the use of phone applications were due to financial concerns. This was evident in their decision making between calls and texts, and in particular, the large number of students who changed their SIM cards monthly to keep the costs down.

Despite the various functions available on today's mobile phones, the two basic and most used were still making phone calls and text messages. A large number of students showed that they sent more text messages than making phone calls, and this was due to cost concerns. They provided a cost calculation: texts cost 0.1 RMB per message depending on the network, often a lot cheaper if subscribing to text packages. Local calls cost 0.2 to 0.6

RMB per minute depending on the network, and it was even more expensive to call numbers outside the city. Thus most students choose to send texts if they could, to avoid making phone calls.

‘I send a lot of texts. Most of the texts are to friends from high school. Since most of them study in different cities, it’s expensive to call, so I use texts instead’.

(I1, Third Year, Business, Female)

Moreover, students had even cheaper alternatives to sending texts. If there was something that they needed to discuss in detail or was difficult to communicate just using texts, they would resort to QQ, - the most well-known online messaging service in China at the time. They would send text messages to their friends to ask them to log onto QQ and then chat with them there.

‘If there is really something we need to discuss properly, I would send him a text message and ask him to log onto QQ, so that we could talk from there, because it’s cheaper. 200 texts allowance would be soon used if we need to discuss things properly, but it’s free on QQ’.

(L1, Third Year, Mechanical Engineering, Male)

When asked how many texts they sent a day, the answer depended on their available text allowance.

‘It depends, depends on whether it is the beginning or end of the month. Very few texts are sent at the beginning of the month, and lots of texts at the end of the month if there’s any unused allowance, about 100 per month’.

(B3, Third Year, Education, Female)

### 6.6.2 Monthly change of SIM cards

As was evident from the students' choice between sending texts and making calls, for many cost was the main issue regarding their use of mobile phones. One might argue that students' preference for text messages over calls was largely due to cost concerns. It became apparent throughout the interviews with students from year one to three that, many changed their mobile SIM cards monthly simply because it was more cost effective to do so.

In Jinan, where the university was located, the telecom network offered 50 RMB worth of free credit every time one signed on for a new SIM card, which itself only costs 20 RMB. In other words, students paid for 20 RMB and received 30 RMB extra credit free. For this and this reason alone, many students changed their SIM cards every month, even though changing SIM cards meant that they would change their number, with all the hassle of informing everyone of their new number. For example, E3 from Jiangsu said he changed his mobile SIM card every month, and even he himself couldn't remember the number. He sent group messages to his friends every time he changed to let them know his new number. It was normal for him because many of his friends did exactly the same

'I use different SIMs for university and home. It costs more if you were in different cities... I notify friends my new number using QQ and SMS...If it is my good friends, I would send texts to let them know my new number, for other acquaintances, I would just leave them a message on QQ'.

(H2, Third Year, Computer Science, Male)

Nevertheless, there were students who preferred to keep their SIM cards, because they couldn't be bothered with the hassle.

'I don't change my SIM card, too complicated, and can't be bothered. I haven't changed since I came to this University'.

(G1, Second Year, Business, Female)

### **6.6.2 Choice of communication tools for different purposes**

The students were well aware of the communication tools available to them and could confidently choose which to use according to their specific needs.

'Make calls or send texts, depends on the communication group. For example, if it's to teachers, I would make phone calls; close friends, texts; parents, phone calls as well...QQ is for some friends and people I don't know'.

(L1, Third Year, Mechanical Engineering, Male)

The students used different instant messaging service for different friends. For example, one would use MSN and 163 emails to communicate with friends abroad, while using QQ to keep in touch with friends in China.

'I definitely use more QQ. Whatsoever; there are not a lot of people using MSN. QQ is so common, almost everyone has it. I normally log on to QQ, and seldom log on to MSN.'

(F2, Third Year, Languages, Female)

QQ and MSN are the most two popular instant messenger applications in China.

Nevertheless, QQ was more widely used among university students in China. Not many people used MSN, while almost everyone had a QQ account.

‘I use MSN, but it’s not as convenient as QQ. Maybe it’s the habit, I’ve been using my QQ account since high school. My friends helped me applied for MSN at the end of year one in high school. Yes, it does have space etc, similar to QQ. However the main problem is there are few students using MSN than QQ. It’s not convenient to use if there’s not many friends using it. ’

(C1, Second Year, Civil Engineering, Male)

Even within QQ, there were different levels of chatting according to whom the students were communicating with.

‘I have different opinion towards communications. For me, to people close, I would chat; if not, I wouldn’t chat much. Just log on QQ and be there. ’

(J2, Second Year, Mechanical Engineering, Male)

### **6.6.3 Social networking sites versus blogs versus QQ space**

There was a certain number of students who enjoyed writing and sharing online diaries. There were various service providers who could support this goal, such as blogs, QQ spaces or social networking sites. However, many of the students who had used other diary providers had turned to QQ space because it was more convenient since it was integrated with the popular chatting software- QQ.

‘I used to write blogs on Sina, when I was in high school, but haven’t used it for a long time. Now I use QQ space, because it’s more convenient, you don’t have to re-open the WebPages to log in.’

(C3, Second Year, Civil Engineering, Female)

Though many of the online service providers offered similar functions, students tended to have their own perceptions and strategies for choosing what to use, when and where. For example, H2 treated 163 blogs more like his home page, whereas he preferred social networking sites like Xiaonei to share videos and articles, and to chat with friends.

‘I keep my blog at 163. I would write most of my diary in my blog, rarely writes in Xiaonei. I use Xiaonei to share videos and articles, though I can also share videos and articles in my blog. Not for a particular reason, but I feel like blogs is my own home page, Xiaonei is better for chatting.’

(H2, Third Year, Computer Science, Male)

‘You choose to use which one depending on what you want to do. I write diary in my QQ space. Xiaonei, is more like an online USB memory stick, where you save some pictures or share other’s interesting stuff... You can also upload photos in QQ space, but the storage is limited.’

(H1, Third Year, Computer Science, Male)

Interviews showed that an important factor influencing students’ preferences for tools was their friend-bases. This was especially true for social networking sites. Not only did students switch to QQ space from Xiaonei, there were also students who changed preferences from QQ to Xiaonei because more of their friends had started to use Xiaonei.

I now used Xiaonei more often because more of my friends are using it. I started using Xiaonei before I entered university. There was a leaflet in the university offer letter, and I registered and invited friends. Eventually all of my friends were using it, so I used it more often, it's very convenient to find people.'

(H2, Third Year, Computer Science, Male)

'I used to use QQ space decoration and QQ pets, QQ levels. I was first invited to Xiaonei by a friend of mine, I didn't use it for the first half a year, and then when I logged on, I saw all my high school classmates were on Xiaonei, and that made me use Xiaonei as well. I later found a few interesting little games on Xiaonei and played for a while.'

(H1, Third Year, Computer Science, Male)

Nevertheless, there was often an overlap of students' friend lists on the various service providers; for example, H1's, friends on QQ are also friends in Xiaonei.

'Some of them like Xiaonei, some of them prefer QQ...For myself, I used to prefer QQ, but later changed to Xiaonei. Now I don't have preference towards either of them, they are just different communication methods'

(I1, Third Year, Business, Female)

## **6.7 How do students 'experiences with technologies change with years?**

The interviews showed that as the students proceeded through university, their attitudes and use of ICT changed.

As the students went from year one to three, their curriculum got became more intense. Many of those who used to play games on computers found themselves too busy to do so. Instead, they used computers to help with their life and study, such as writing dissertations, looking for information, preparing job applications etc.

‘In terms of using technology, there’s been a big change from year one to year three. I often play online games when I was in first year, didn’t play so much in second year, and when I came to third year, I don’t have time for games at all, and I don’t feel like playing either, not interested anymore.’

(F3, Third Year, Languages, Female)

‘I spend more time online as I get to higher year...When I was in first year, I play very simple applications, like Xiaonei; when I came to second year, I search for information; in third year, I’m busy with writing essays, preparing dissertation, looking for jobs, making CV, reply interview emails etc.’

(F2, Third Year, Languages, Female)

For others, as their use of technologies increased over the years, their experience with different technological tools become more versatile and they became more reliant on these technologies to improve their lives.

‘There’s a change. I didn’t have mobile when I started at year one and it didn’t matter at all. At that time, I felt it was a waste of money to have one. However, now I have a mobile phone and I can’t live without it.’

(B1, Third Year, Education, Female)



### **6.7.1 Job hunting in senior years**

When the students arrived at year three in university, their focus of life changed as the curriculum developed. For example, there were students who used to change SIM every month, but had stopped doing so because they needed to keep the same phone number to keep in contact with potential employers. For students in the senior years, one of the most important tasks was job hunting.

‘I can’t change numbers now, otherwise they can’t find me... this is especially the case for us third year and fourth year students, what we are facing is job hunting, mobile is the only communication tool we have. Compared with mobile phones, mails are too slow, and not as convenient either.’

(F2, Third Year, Languages, Female)

### **6.7.2 Change of attitudes towards computers and the Internet**

Similarly, students’ attitudes towards computers and the Internet also changed as they progressed through university. Some who used to use Internet every day had stopped doing so as they became busy with other activities; some who used to be enthusiastic about playing online games or online chatting, had lost their interests after a while.

‘For some time, from third year senior school to second year university, I really enjoyed getting online and playing computer games, but after a while, I lost that feeling. Maybe it’s because I’ve been playing for a long time, I’m not excited any more. Now, I won’t bother using the computer unless there’s something I need to do, like something to download or search. For pure pleasure, I won’t go’.

‘I used to go to the Internet café every two or three days and spent three four hours there every time I visit, now I only go there once or twice a week and I don’t spend long there either’.

(D1, First Year, Computer Science, Female)

### **6.7.3 Attitudes towards instant messaging**

When many of the students started using QQ, they had chatted a lot just for fun. However as they had become more familiar with the application, the excitement was lost, and they started to use it less and less.

‘We’ve passed the period when you chat a lot. It’s not interesting any more’.

(B2, Third Year, Education, Female)

They no longer chatted online with people whom they did not know; instead, they only used QQ when they needed it and in the way they wanted. Rather than showing their status online, many of the students signed in as invisible and only chatted when they needed to.

‘I used to chat on QQ, but now, I immediately change my status to invisible as soon as I log in...There are too many people chatting with you once you are on.’

(E2, First Year, Mechanical Engineering, Male)

Rather than chatting for fun and using it as a virtual platform where people could say whatever they wanted and still be identified, students started to view instant messaging as a cheap and alternative communication tool to mobile phones, as they grew older.

‘Now, QQ number is almost the same as mobile number. It’s the second way of communication between friends apart from mobile phones.’

(C1, Second Year, Civil Engineering, Male)

## **6.8 Themes and discussion**

After an overarching analysis of the results, three evident themes emerged from the data, including the students’ use of mobile phones; the role of computers and the Internet in relation to university life; and the unique participatory culture.

### **6.8.1 Mobile phones**

Students’ use of mobile phones emerged as one of the important themes from the interview data. This is of particular interest as they are the most widely owned and used devices among students. When asked what difference losing a device would make to their lives, taking away their mobile phones seemed to cause them the most concern. In a developing country like China, where ubiquitous network access is limited, the students were making the best use of scarce resources. Many students, who did not have their own laptop or /computer, downloaded music, /documents and /books from the Internet on public computers and transferred them onto their mobile phones and listened to them or /read them from there. This raised the interesting question of the availability and use of technologies among students, which will be discussed further in chapter 7.

Everyone interviewed had a mobile phone and a large majority used their mobile on a daily basis, mostly to make/receive calls and send/receive texts. Students reported that mobile phones were especially useful for keeping in contact with friends and families when they

were apart. Since many school leavers go to universities in different cities all over the country, they often have to be away from home and friends. With mobile phones, they could keep connected wherever they were.

Besides basic functions, a large number of students were actively using their mobile phones as cameras, MP3 players, data storage devices, personal organizers and even e-book readers from the relatively small screen. For instance, several students mentioned during interviews that they would download e-books from the Internet onto their TF card (a type of mobile memory card, commonly used by current mainstream mobile phones, such as Samsung, Nokia and Motorola) and read it on their phones. When asked whether they found it difficult to read on such a small screen, none of them seemed to be bothered about this.

‘I use my mobile to read e-book, I download the book from the Internet and save it in my mobile’s TF card.’

(L2, Third Year, Mechanics and Automation, Male)

There is a large proportion of students accessed the Internet through mobiles. This also confirmed the results of the survey, which found that 70% of students used the Internet on their mobile phones. As can be seen from the interviews, despite the low ownership of personal computers and use of the Internet, an increasing number of students frequently accessed Internet on their mobile devices. They enjoyed using QQ on their phone and subscribing to the mobile newsletter. Compared with going to computer rooms or/ Internet cafés to access the Internet, subscribing to the mobile Internet allowance actually worked out cheaper. The students enjoyed use of the Internet on their mobiles as it saved both their time and money and provided them with more freedom.

‘I use mobile Internet to log on QQ, read news, and search for information, such as train tickets to go back home.’

(M1, First Year, Arts and Design, Female)

Nevertheless, it is also worth noting that despite the various things that students could do with mobile phones, they mainly used them for social and leisure purposes rather than for learning. None of the students interviewed said that they would call or send texts to directly discuss any subject matter, though they did use their phones to organize study related issues. Students seemed to think that there was a distinct dividing line between learning issues and their social life. Mobile phones were important tools for their social life, but were not directly related to learning. For more serious learning issues, students preferred to have a face-to-face discussion if possible. Given that universities in China are relatively centralized compared to other western universities, there were 6 to 8 people sharing each dormitory. Students could easily talk about subject related matters in person instead of discussing them on the phone.

### **6.8.2 Integration of computers and the Internet into university courses and programmes**

Another strong theme emerging from the data is the lack of integration of computers and the Internet into study such that students see computers as a 'luxury' added if they are core to subject area (computing) or in 'spare' time. Computers and the Internet were viewed by most students as independent from formal study. On the surface level, such attitudes may be passed down from their parents and teachers since secondary school, when computers and the Internet first became largely accessible in China. Parents and teachers viewed computers and the Internet as a leisure activity and a distraction from students' study, thus

classified them as 'games' which students played in their leisure time. In essence, such attitudes were enhanced by the fact that computers and the Internet had not been fully integrated into courses and learning programmes. It is evident from the interviews that most of the time students felt that there was no need for them to use computers or the Internet for study. They were comfortably coping with their studies without frequent use of computers and or the Internet. They viewed computers and the Internet as 'leisure'.

'I haven't been online for a while... There's not much to do online, isn't it a waste of time? I don't like playing online games either. Usually, I would go to the library to read after class.'

(C2, Second Year, Civil Engineering, Male)

There were also others who clearly identified Internet activity as 'free' time, not study, and as a form of 'play'. They spent a lot of time on the Internet to relax and entertain themselves after school. The Internet, for them, had become a major form of 'play'.

'I go to the Internet café whenever I'm free, about 4 or 5 times a week. I spend about 3 hours every time I go there. I would normally go there after evening class. Study in the day time and play in the evening. University life is boring. We have a lot of free time'.

(E1, First Year, Mechanical Engineering, Male)

For others, university courseware and class schedules already occupied most of their daily activities. Coping with subject study was the priority, and this had already consumed much of their energy. When possible, they would rather do something else than surfing online in a purposeless way.

'I don't have a lot of time to get online. I'm already very busy everyday, practicing drawing, piano etc.'

(B2, Third Year, Education, Female)

There were also students who noted that they would arrange their online times according to their study schedules. They spent time online when they were free, and stayed away from computers and the / Internet when they were busy with study, especially when exams were approaching. They implicitly accepted the idea that study was marked by an absence of computers and that time spent using a computer counted as leisure.

'It depends; I would get online when I'm not busy with study. However if I'm busy, I wouldn't go'.

(E2, First Year, Mechanical Engineering, Male)

Nevertheless, the results showed that there may be a need for a central Virtual Learning Environment (VLE) or Course Management System (CMS) infrastructure at the university. For instance, many said they would come to the instructor and copy Powerpoint presentations from the instructor's computer after class, so that they could review the materials afterwards. In addition, instructors would sometimes set up a group email account for the whole class and share courseware via email. In comparison, in the UK, the USA and other advanced industrial countries there would have been a VLE (or CMS) on which lecturers would post their slides and additional notes, images etc so that students could access them when they chose.

This implicitly raised the interesting question of the lack of integration of computers and the Internet in study and students' requirements for study. Although there was a strong urge from the students for learning, computers and the Internet were not being utilized to support their learning nor had they generally been incorporated as part of their course. If

students are to see computers and the Internet as an integral part of their studies, universities in China need to acknowledge and address the gap between university infrastructure and today's students' needs. By providing better learning facilities and training opportunities they could facilitate students' learning by fully utilizing the power of computers and the Internet.

### **6.8.3 Participatory culture**

One of the claims about the Net Generation was that they were actively engaged in the process of creating and sharing knowledge (Prensky, 2001a, 2001b). However the interview results from this study clearly showed that most of the students were passive consumers of information instead of active creators of information. They used Internet services such as Wikipedia and, Baidu-pedia to search for information, but few students had ever engaged in contributing to the general knowledge pool. Students made very little use of collaborative knowledge creation tools and only a small percentage of students were engaged in creating content on the web.

The interview results on students' attitudes to participation contrasted to the rhetoric around web 2.0. Examples of web 2.0 sites include social networking sites, blogs, wikis, picture/video sharing sties, social bookmarking, RSS feeds, mashups and micro blogging etc. One of the most evident features of web 2.0 sites is that they encourage users to interact and collaborate with each other in a virtual community as creators of user-generated content, in contrast to traditional web 1.0 websites where users are limited to the passive consumption of content that has been made for them. In general, there was a lack of active participatory culture amongst students in their use of web 2.0 sites.



The interviews showed that video viewing and /downloading was popular amongst students, but not video sharing. First of all, the famous video sharing site-YouTube was blocked in China for political reasons. Even though there were a few similar sites to YouTube in China (e.g. Youku, Tudou) where students could view or /download videos and also upload their own videos, most of the students only used the site to view or /download content but not for contributing. Those who engaged in viewing or /downloading greatly outnumbered those who uploaded their own generated content. As the interviewees expressed it, there was neither the requirement nor the motivation for them to do so. This was not because of their lack of competence in uploading content to the site, nor any technical barriers, but simply because of a lack of participatory culture.

‘I haven’t updated any videos online, and I don’t think that’s something interesting, I just don’t need it, and rarely go to sites like that.’

(I1, Third Year, Business, Female)

Similarly, photo sharing sites were not frequently used among the students. However, instead of using sites like Flickr, students uploaded their pictures to their QQ space, or social networking sites, e.g. Kaixin, Xiaonei. The students enjoyed uploading and /sharing pictures with friends, but in a slightly different manner. There was no popular site in China specifically designed for sharing photos such as Flickr; instead, photo sharing features were included in social networking and blogging sites and used as part of the students’ social networking sites (SNS) or blogging activities. Rather than using photo sharing sites like Flickr as social networking sites, those who used them were largely professionals interested in photography. Their rationale for using the site seemed to be different from the majority of the students who would just share or comment on photos from a social and leisure perspective. Some active users would just upload a photo to their space as soon as

they had taken it on their mobile phone. They enjoyed sharing pictures with friends and family, and receiving feedback from them encouraged them to share more.

With regard to use of blogs, some students frequently checked out others' blogs but few actually maintained and frequently uploaded their own blogs. Even when browsing other students' entries, only a few would leave comments. The same applied to social networking sites; more people were interested in browsing others' profiles than constantly updating their own. All of these points raised an interesting question as to whether the development of web 2.0 in China is behind industrial advanced countries and whether Chinese students will change in the future? Is there a resistance to the participatory culture in China as found in YouTube and Flickr in the west? Or does there simply exist a different kind of participatory culture in China that is different from that in the west?

## **6.9 Summary**

Despite the wide claim that the Net Generation students are naturally competent and active users of advanced technologies, the students' experience with technologies varied a lot. They were not naturally capable and confident with technologies. Furthermore, though technologies occupied a significant part of the students' daily activities, they were mainly used for social and entertainment purposes. Computers and the Internet were not an integral part of the student's university learning, rather, they were regarded as a leisure and social activity.

There does not seem to have been a strict linear development of e-tools use in China, particularly in the development of communication tools. For instance, only a small number

of students had ever used email, while most of them were active users of QQ, the IM service in China. Mobile Internet and IM were comfortably built into students' daily activities with text messages. Although not all of them were competent with basic work applications, e.g. Word, PowerPoint, Excel, many of them were frequent users of social networking sites and blogs, like Xiaonei and QQ space.

Despite the growing media attention from the west and the predictions of commentators who suggested that many of the Net Generation were actively engaged in the process of information and knowledge creation (Lorenzo, Oblinger & Dziuban, 2007), the interview results showed that the students' use of recent web 2.0 technologies, including social bookmarking, RSS feeds and, micro-blogging were still in its early stages.

Nevertheless the students' skills of problem solving and acquiring new knowledge did seem to be distinct from traditional school days. When facing technical problems, the majority of the students tried to solve the problem on their own or by learning from their peers. Asking for help from their teachers was the last resort. Compared with the passive reception of knowledge, students' found that their active self-exploratory behaviour led to better perception and grasp of the skills. Furthermore, in comparison with traditional learning from books, many students preferred to learn from videos. Instead of black and white text information, an increasing number of students searched online for video clips to help with their problems and explained that 'it's easier to follow and understand than pure texts'.

While there is a global growing interest in the attributes of 'Net Generation', it is important for educational departments and universities in China to ensure that decision-making about how to use technology to facilitate learning is empirically informed. With China's specific

context, further exploration of university students' use of technologies in China in comparison with other countries will be discussed in Chapter 7.

# **Chapter 7 Discussion and Conclusion**

## **7.1 Introduction**

The research started with my curiosity to understand how ‘Net Generation’ university students in mainland China make use of the various available technologies, as compared with ‘Net Generation’ students in other countries. The main research question was how university students’ China use technologies in their daily activities and to support their learning. The subsidiary research questions were:

- How do university students in China use technologies in their daily activities?
- How do university students in China use technologies to support their learning?
- Is there any variation in students’ use of technologies across disciplines?
- Is there any variation in students’ use of technologies across years of study?
- Is there any gender difference in students’ use of technologies?

For the purposes of this study, students’ use of technology was investigated from three perspectives: use of, skill levels with and attitudes towards the use of technologies. Both quantitative and qualitative approaches were adopted. The empirical research consisted of two stages, a large scale questionnaire and follow-up focus-group interviews. Two thousand nine hundred and twenty students from seven disciplines over three year years completed the survey, and 29 were selected to take part in follow-up interviews with a broad representation of disciplines and year levels.

The purpose of the present chapter is to draw major conclusions from the study with respect to the existing literature about university students’ use of technologies in China.

Section 7.2 aims to provide a summary of the main findings. Section 7.3 explores the impact of Chinese traditional culture on today's learners. Section 7.4 identifies the limitations of the present research and provides suggestions for further research. Finally, section 7.5 highlights the main contribution of the research study to knowledge and understanding of students' use of technologies in higher education in China, including the implications for Chinese university students, educators and higher education policy makers.

## **7.2 Findings**

### **7.2.1 Access to computers and the Internet**

It was shown from the quantitative data that students' ownership of computers at university is surprisingly low in this study. This provided a clear contrast to research from western industrial advanced countries, including the United Kingdom (Jones *et al.* 2010; Margaryan and Littlejohn, 2008), USA (Salaway *et al.* 2008) and Australia (Kennedy *et al.* 2008a). In UK universities, over three quarters of the students owned a laptop and over a third owned a desktop (Jones *et al.* 2010); in comparison in China only 19.3% of the students owned a personal laptop and 19.7% of the students owned a desktop. Furthermore, because of the restricted provision at university, where they had no wireless connections on campus, students were obliged to connect to landlines if they wanted Internet access in the dormitory.

Since few students had unrestricted access to personal computers, most of them accessed the Internet from on-campus computer rooms and public Internet cafés. In comparison with the United Kingdom (Jones *et al.* 2010), where over two thirds of the students felt that their access to computers was sufficient to meet their needs, interviews from this study

showed that most students said their computer access mostly met their needs. One explanation for this could be that students' perceived computer/Internet needs in Chinese universities are relatively low compared with advanced industrial countries. In those countries students rely more on computers and the Internet to help with their social lives, study or entertainment, whereas university students in China spend more time on traditional face-to-face socialising and are comfortable accessing computers at computer rooms and Internet cafés.

### **7.2.2 Internet on handheld device**

A common theme that permeated most of the interviews was the rise of mobile access to the Internet in students' lives. A large proportion of students would access the Internet on their mobile phones, especially with the availability of increasingly affordable devices and network charges. More than 70% of the respondents accessed the Internet via their mobile phones according to the survey. Comparing with results from the United Kingdom (Jones *et al.* 2010) where less than 15% reported using the mobile Internet, mobile Internet access among students in China was surprisingly high.

Interestingly, the Internet on handheld devices was enjoyed by both students who had unrestricted access to computers and those who did not. For students, where there was limited access to fixed-line Internet and personal computers, mobile Internet provided an opportunity to access the Internet whenever they needed, conveniently and at a reasonable price. The student interviewees who did not have access to a personal computer noted that, when comparing the cost of subscribing to the Internet on mobile phones with going onto the Internet via cafés or computer rooms, the mobile Internet worked out cheaper and more convenient. However, most students used mobile Internet for personal and social purposes,

e.g. browsing web pages, checking out the news, searching for information, instant messaging, and social networking. Few used it for learning purposes.

Nevertheless, it is not unique to China that the use of mobile Internet has spread in groups with low access to fixed-line Internet. Similar use of mobile Internet has been observed in South Africa (Czerniewicz *et al.* 2009), where students are often in severely constrained circumstances. Despite the cost implications, students from all socio-economic backgrounds in South Africa use the Internet on their mobile phones, though mostly for academic purposes. The spread of Internet access via mobile phones is remarkable, even when students have other options available to them. Mobile phones provided an opportunity to bridge the digital 'divide' in access. It was used as a main means of accessing the Internet off-campus by South African students from low socio-economic backgrounds (Brown & Czerniewicz, 2009), and it was reportedly used for learning to a similar extent by students at both ends of the spectrum in terms of their skills and experience. A survey of low-income Black South Africa youth (Kreutzer, 2009) showed that the majority (83%) accessed the Internet via their phones and almost half of their personal expenditure was spent on mobile phones.

### **7.2.3 Role of technology in students' lives**

It is true that there exist many young students in China who are active users of the Internet as reported by Tapscott (1997; 2008), Howe & Strauss (2000), Prensky (2001a, 2001b), Oblinger & Oblinger (2005). However, students' activities should not be viewed in a one-side way without regard to other aspects of their lives. Both the quantitative and qualitative results from this study showed that students use a range of technology-mediated communication tools apart from their face-to-face interactions, providing wider scope for student communication. Students take part in social activities, sports, student societies, and



they spend much of their time meeting and going out with friends. Media use is just one of the many ways that they spend their leisure time.

In terms of interaction, there was evidence from the qualitative data that students still prefer talking to friends face-to-face or using mobile phones if they can. They still watch traditional television and listen to music from MP3 players, and their main source of information is still print media. Instant messaging or social networking sites are used primarily for maintaining links between people who are already friends, rather than creating new points of contact with a wider community of students from other institutions. Despite the various applications available on phones, the most used features were still making phone calls and sending text messages. Students' actual motivation and interests in using their mobile phones was not directed by the advances in technology but by their needs in socialization. This adds to Schulmeister's (2008) comment that today's young people grew up with the new media and regard them as no more remarkable in relation to their normal daily lives than earlier generations regarded media in their days. Other than spending time online for social and entertainment purposes, the survey showed that young people were also active in traditional face-to-face social and leisure activities 'offline'.

#### **7.2.4 Using ICT for social and entertainment purposes**

Despite the growing numbers of educators who celebrate the potential of social media to engage learners with their studies, the qualitative results from this research showed that most students' used ICTs for social and entertainment purposes, e.g. to listen to music, to watch movies, to play games or for chatting; few used it to help with their studies.

Similarly, Corrin *et al.* (2010) found that, in Australia, students' use of technologies to support academic study was generally lower than their technology use as part of everyday life. A number of activities listed as academic uses would occur only if they were

incorporated into their coursework (e.g. writing a blog, building a website). Contrary to Conole *et al.* (2008), the students were not adopting and adapting these technologies as part of their personal study methods.

For instance, students' pervasive use of Instant Messaging (IM) was also mainly for social and entertainment purposes; few students actually used it for study. Similar observations have been made in Australia (Oliver and Goerke, 2007), where instant messaging was used primarily as a social device. Moreover, surveys involving students in higher education showed that there was no transfer of technology experience from social life and leisure to study and learning preferences (e.g. Kvavik, 2005; Kvavik et al, 2004; Kvavik et al, 2005).

Students' use of social networking sites (SNS) was mostly for social reasons and the experience of being a student rather than formal teaching. Corresponding with results from the United Kingdom (Selwyn, 2009b; Madge *et al.* 2009), education and university-related exchanges were only a small part of the students' overall activities on social networking sites. Students' use of SNS was more for socialising and talking to friends about work than for actually doing the work. Much of students' education-related use of social networking application was within the 'identity work' of being a university student, including critiquing learning experiences and events, exchanging information about assessment requirements, supporting with assessment or learning etc. Nevertheless, most students were not keen on using social networking for formal teaching purposes.

This research adds to previous research (Kvavik, 2005; Kvavik et al, 2004; Kvavik et al, 2005; Schulmeister's, 2010) that where education is not the primary purpose of media use, there is no transfer from extensive computer experience to learning preferences or competence. It is clear that with no university provision for using social media for formal learning, students were comfortable with the current provision and were satisfied with the

fact that there was no intrusion from university life into students' private and interpersonal worlds. This finding is consistent with Waycott & Kennedy's results (2009) as it appears that the blending of social and formal spaces for learning may not always be desired by students. This also adds to findings by Gray *et al.* (2010) where over one quarter of medical students reported using Facebook for education-related reasons. Nevertheless most students still used Facebook's affordances 'very conservatively to support their learning, not making major innovations in study techniques, nor going beyond their university to form learning networks' (p.975).

Despite the growing excitement within the educational community over the use of 'social software' and 'Web 2.0' technologies (Crook, 2008; Selwyn, 2010a; Selwyn, 2010b; Waycott and Kennedy, 2009), caution should be exercised when implementing everyday technologies in formal teaching and learning. It is important that decision and policy making is based on empirical evidence of how such tools can be best used to support learning, and they should not be based solely on assumptions about the skills and experience of so-called Net Generation students. It is imperative that researchers and practitioners evaluate the successes as well as the challenges involved in incorporating everyday technologies into educational settings.

### **7.2.5 Integration of computers and the Internet into study**

One of the important findings is the observation that students primarily view computers and the Internet as the basis of social or recreational activity in their lives and not as central to their study. However, the evidence of students' copying courseware onto memory sticks implicitly shows that there is a lack of integration of computers and the Internet in study

practices, and there is little requirement to learn about the place of computers and the Internet in relation to study.

Students' choices of technology use are not natural correspondence of the universally available technologies; rather the local infrastructure and requirements for technology use set out in course requirements make an impact. This finding corresponds with that of Jones *et al.* (2010) who suggested a link between students' use of technologies and course requirements. Only a small number of students in this study used computers for learning when they were not asked to do so. This was particularly evident in the case of advanced media manipulation and other forms where students explained the reason they didn't use it often was because they were not required to do so. The amount of technology use was largely driven by lecturers' requirements within their courses. On the contrary, when different ICTs were embedded in learning activities (e.g. word editing, audio/video viewing, transferring files) then students were very likely to use them. When students are not required to use computers at all by staff, they exhibit less frequent use themselves; conversely, when students are required to use computers as part of their course, they use computers more frequently.

For instance, use of email among the students was relatively low, compared with results from western advanced countries, e.g. Australia (Judd and Kennedy, 2010), USA (Kvavik, 2005), where email was the primary method of students' electronic communication. Unlike these countries where email accounts are allocated to students at university, there was no electronic system for submitting assignments, and students only used personal emails to send electronic assignments when they were occasionally required to do so. Emails were rarely used as communication tools among students and between students and teachers. Students' use of emails was largely voluntary, for personal reasons.

This contrasts with findings from Krause (2005) where a large number of students surveyed used emails to keep in touch with peers and lecturers, and one-fifth did so regularly. It also adds to Rønning and Grepperud's (2006) findings in Norway that email played a less important role than was expected as communication tools among students and between students and teachers outside formal class sessions. While Judd and Kennedy (2010) found that there was a movement away from email, particularly from institutional email, towards social networking sites, it would be interesting to find out whether Chinese students have by-passed emails while students in the USA or Australia continue to use email because it is institutional resource, or whether Chinese students are behind because computers and the Internet have not yet been built into university study requirements and students are likely to arrive at a similar use of email when it is integrated into study.

Despite the national initiative to incorporate digital technology into Chinese higher education, there was no centralised VLE system at the university. Although lecturers could use computer mediated courseware to help with their tutorial, there was no centralised VLE system in which students could access such course material online or send and receive assignments. As shown in the interviews, students who wanted the courseware would need to copy it from their instructor's computer onto their memory stick and then review it after class. Alternatively some instructors would set up a group email for their students and share the courseware using email. Despite the fact that students could log onto the university website to check for administrative information about their courses, onto the university forum to chat or onto e-library to check for information, there was no centralised VLE system with training for staff and no encouragement for broader use of online support. Most of the courses were in the form of traditional face-to-face tuition aided by some multi-media courseware. The students hardly used any innovative technologies to help with their study, nor were they required to as part of the course requirements.

## 7.2.6 Not a homogeneous group

Despite the claims about a whole generation of young people with a natural aptitude with technology, the results of this research suggest that not all students met the criteria of the ‘digital native’ as defined by Prensky (2001a, 2001b, 2009) or the ‘Net Generation’ defined by Tapscott (1997, 2008). Students born into the Net Generation cannot be assumed to have grown up digital, nor can it be assumed that they are homogeneous in terms of their computer experience. Comparisons within the age group show that students’ range of access, skills, attitudes and experiences with ICTs is diverse. There are students with low, medium, and high levels of experience even within the same age group. Empirical evidence refuting the homogeneity of this grouping in response to new technologies has also been demonstrated in other international contexts, including the United States (Hargittai, 2010a, 2010b) Canada (Bullen *et al.* 2008), the United Kingdom (Jones *et al.* 2010; Margaryan and Littlejohn 2008), New Zealand (Sherry & Fielden 2005), Australia (Kennedy *et al.* 2008) and South Africa (Brown & Czerniewicz, 2010).

Even within the same population and generation of students, experience with ICT varies from person to person and from time to time. Most of the students interviewed did not generally use computers or the Internet unless they saw a particular need.

‘In my spare time, I prefer to go play basketball in the playground than sitting beside the computer watching the screen. It’s boring. For example MSN or QQ, if we can contact each other without using it, why do I care to use?’

(L1, Third Year, Mechanical Engineering, Male)

According to interviewees, the reason they didn’t spend a lot of time online was because they rarely had spare time to do so. Course work and university activities took most of

their time and energy. With a lack of integration of computers and the Internet in formal learning, students would rather do something other than ‘un-purposely surfing online’ when they have free time.

Nevertheless, despite the majority who made moderate use of computers and the Internet when they needed to, there were also a small number of students who spent a lot of time online. For example, C3 spent about two hours online every day, and this had become part of her daily routine. She carried out a variety of activities online, e.g. reading ebooks, reading web pages, downloading music or pictures, browsing spaces, blogging, and chatting with friends. She regarded the Internet as part of her daily activities and believed that ‘there isn’t too much difference between Internet and the reality.’

‘I can’t live without Internet, I get online almost everyday... it’s already a habit, I normally go there every afternoon after class, from 4pm to 6.30pm.’

(C3, Second Year, Civil Engineering, Female)

In contrast to those who did not often go online because they were busy with study and other activities, some students used the Internet as a spare time activity.

I1: ‘I would spend time online whenever I’m free and also on Sundays, when I’m not at sleep, I get online...There’s not too much to do during the weekend, it’s too hot outside, and I’m too lazy to go to the city center, I’ll straight go online’.

(I1, Third Year, Business, Female)

Furthermore, age, gender, year of study and discipline all had a significant impact on students’ use of ICTs. The younger the students were, the better access they tend to have with ICT. Men in general had better access to ICT than women. Students’ access to ICT

increased as they went through university, with a large increase between Year 1 and Year 2. Students in the third year tended to have the most access to ICT while students in the first year had the least access.

Students in Computing and Information Technology and Arts and Design tended to spend longer on computers than others, with over a third spending on average between one to three hours on computers everyday. In contrast, students in Education tend to spend the least time on computers and almost 75% of them spent less than an hour per day on a computer. Skill-wise, students in Arts and Design tended to report the highest level of skill, whereas students in Education tended to have the lowest scores, but the variation across disciplines was quite small. With regard to students' attitudes to ICT, there was not much variance across disciplines: students in Arts and Design had the most positive attitude while students in Education had the least positive attitude towards ICT. This was backed up by evidence from students' interviews.

### **7.2.7 Exposure to technology does not lead to natural competence in a whole generation**

Tapscott (2008) argued that an entire generation of young people was becoming 'talented' in relation to new technology, as they were the first to grow up surrounded by digital technology. Tapscott also claimed that this generation exists across the globe, in all economic and social conditions not just in advanced economies. As he put it, 'the most significant change affecting youth is the rise of the computer, the Internet, and other digital technologies. This is why I call the people who have grown up during this time the Net Generation, the first generation to be bathed in bits' (p. 17). Prensky (2001a, 2001b, 2009) made similar arguments about the term 'Digital Natives', which applied to people who had



grown up in a digital environment and were different: 'as a result of this ubiquitous environment and the sheer volume of their interaction with it, today's students think and process information fundamentally differently from their predecessors' (p.1).

The Net Generation and Digital Natives arguments rest on a simplistic form of causality which suggests that technological change in the world leads to changes in attitudes and behavior and even the brain function of a whole generation. However, the results of empirical studies demonstrate that growing up in a technology rich environment does not lead directly to a natural competence in using new technologies amongst young people. Although today's young students use the Internet in a variety of ways, they are not actually as adept as previously thought (Lohnes and Kinzer, 2005; Roberts, 2005).

Students' engagement with technologies is not simply an effect of exposure to the technology. Examining students' survey results in relation to technology, this study found that students' opinions towards the use of ICT at university were generally positive though their self-perceived competence was relatively low. More than 35% of the students reported that they found using technology difficult. It is clear that students did not naturally develop the skills required of them through a general exposure to technologies. In many cases, students only gained a surface familiarity with a variety of web-base applications or general computer programs, and they found it difficult when they came to use specialised software or to implement ICT in their studies. For instance, only 38.3% of the students felt competent to use presentation software (e.g. Powerpoint), and only 29.5% of the students felt competent to use discipline-specific software (e.g. Mathematica, Matlab, AutoCAD, Stella etc).

### 7.2.8 Information searching strategy

Information searching was one of the most popular online activities among students. Being one of the most common online activities, it was also central to the students' lives and a necessary skill to acquire. Corresponding with findings from the United Kingdom (Selwyn, 2008), the interviews showed that academic related information searching was a prominent aspect of students' daily engagement with the Internet.

Nevertheless, students' search strategies were relatively simple. Inefficient search strategies sometimes resulted in no information being found or, on the contrary, an information overload. Many were also unaware of how they could identify the source of information. Many relied on the ranking of the page returned by their preferred search engine to identify what was credible material. Similarly, Hargittai *et al.* (2010) examined students' online searching behavior in the USA and found that students differed in the extent to which they understood the reasons behind search engine rankings. Students often turned to a particular search engine as their first step, they relied greatly on search engine brands to perceive quality, and they rated the credibility of material simply on the ranking of the returned page.

Confirming previous findings in China (Wang *et al.* 2003; Wang, 2007), university students often showed a lack of information search skills. There was no systematic training provided by the university specially on information searching. Although students did a lot of searching in their leisure activities, most students only possessed basic skills in using search engines. Similar findings have also been reported by McKnight (2010) in the UK, who argued that though students may feel comfortable with using computers at home, they

often lacked information search skills or an understanding of issues of copyright and plagiarism. There was a need at the institutional level to promote the information research process, including advanced search strategies, where and how to locate the information, and being able to critically evaluate the information source.

### **7.2.9 Less competency with advanced technologies**

Despite the general claims that the Net Generation students are naturally competent and active users of advanced technologies, the students' self-perceived skills with the more recent web 2.0 technologies remained low in this study. In fact, during the interview sessions a number of students indicated that they were even unsure what some of these tools actually were. For example, when one student was asked how often she used social bookmarking, e.g. Delicious, she responded by saying: 'What's social bookmarking ? I've never heard of it'. Similarly, in discussions about micro-blogging, a large of students reported being unfamiliar with any such technology or service. At the time of the interviews, the local provision of micro-blogging services such as Twitter was not a major feature in the technology landscape in China. Overall, 42.1% of the participants had never edited Wikipedia or other wiki sites, and 30% of the students never had a blog. 45% of them never used an RSS feed and more than half of them (50.8%) had never used a micro-blogging service. Similar findings have been obtained from United Kingdom (Jones and Cross, 2009) and Australia (Judd & Kennedy, 2010) where students' use of web 2.0 technologies, including Twitter, RSS feeds and social book marking, seemed to be in the startup phase. Over time it will become clear whether students who are currently using web 2.0 technologies are the early adopters of technologies that will become pervasive in the future.

In accordance with the trend found in Australia (Kennedy *et al.* 2007), the results showed that students are nowhere near as reliant on new technologies as some commentators have suggested. Established web applications, such as searching for information, instant messaging, audio and video files, mobile telephony, blogs and social networking sites, are used very frequently by a large majority of students. However newer technological forms, such as mashup and folksonomy (social bookmarking, tagging, video sharing), that allow students to collaborate and to produce and publish material online are used by a relatively small proportion of students. While there was evidence that social networking and digital file sharing were popular among students, few were regularly creating and publishing information.

The results were similar to those from Australia (Kennedy *et al.* 2007), which showed that students frequently used computers to manage or manipulate digital photos and to play digital audio or video files, while more sophisticated media manipulation such as audio and video editing or uploading was much less common. Students more frequently browse photos than using more complicated manipulations like editing and uploading. A similar pattern has been observed with students' activities with audio and video files. It is evident from the results that more students enjoyed browsing (listening to audio/ browsing photos/ watch video), than uploading (uploading audio/ uploading photo/ uploading video), and then editing (editing audio/editing photo/ editing video). And the reason for the infrequency of uploading or editing photo/audio/video files was not due to a lack of skills in doing so. As can be seen from tables 5.4 and 5.12, more students felt competent in uploading and editing than those who were actually doing so. The interviews provided the reason why more complicated manipulations like uploading and editing were a lot less frequent than simple manipulations like browsing photo, listening to music and watching movies. Many of the students expressed the view in the interviews that they did not feel like engaging in this way because it was not something they found interesting and they

were not requested to do. In a word, there was no motivation for them to do it, either internal or external.

It is not prudent to generalise about a whole generation, while overlooking the differences among individuals. While mobile and Web 2.0 technologies clearly show the potential to support a range of learning tasks that may benefit students, one should not assume that all students see these technologies as applicable and easy to use in a formal learning setting.

### **7.2.10 Participatory culture**

Contrary to the predictions of commentators who claim that many of the Net Generation are not content to just consume information from traditional media sources but want to be active participants in the information and knowledge creation process (Lorenzo, Oblinger & Dziuban, 2007; Prensky, 2001a, 2001b), qualitative results from the study showed that few of the students were actively involved in information sharing and knowledge creation.

For example, a large majority of the students used Wikipedia as a place to search for information, but few ever contributed any content to the site. Similar findings were obtained by Nagler and Ebner (2009) who investigated 1149 first year university students at an Austrian and Swiss university and found that most of the technologies that were frequently used, such as Wikipedia, were only used for the passive consumption of information. This adds to results from the USA (Kvavik *et al.* 2008) and the United Kingdom (Margaryan and Littlejohn, 2008) which found that students made very little use of collaborative knowledge creation tools and that only a small percentage of students were engaged in creating content on the web.

Web 2.0 technologies involve information sharing and collaboration between users. As Crook (2008) commented, web 2.0

‘is largely about making more opportunities for the user to publish and communicate. It is about uploading rather than downloading. About coordination, rather than delivery. So, for learners: it’s about more audience, more collaboration, more resource.’ (p 30)

The term includes social networking sites, video sharing sites, wikis, blogs, social bookmarking and micro-blogging, where users are increasingly involved in creating web content as well as consuming it.

Consistent with findings from Australia (Gray *et al.* 2010; Kennedy *et al.* 2007), the idea that web 2.0 technologies can transform young people from passive and disengaged learners to active and participatory learners was not well evidenced in this study. Despite the increasingly embedded use of web 2.0 applications in the students’ everyday life, few were actively engaged in creating content. Students indicated in the interviews that they were more likely to be browsing other people’s profiles and updates than posting their own. They would only occasionally comment on other’s posts on either SNS or blogs. Not to mention image/video sharing sites and wikis. The number of students downloading information from these sites far outnumbered those contributing to it. These findings are consistent with previous work in Hong Kong, where Chu (2010) concluded that young people were far from active users or consumers in the new media age. Instead, students went online mainly for entertainment purposes, were not familiar with information management tools, blogged infrequently, and rarely engaged in image/video sharing such as via YouTube.

## 7.3 Chinese learners

For five thousand years Chinese civilization has been subjected to the ups and downs of history. Bred in such a rich environment, the Chinese have formed their unique ideology and values. The inherited stability of traditional Chinese culture, which is largely influenced by Confucianism, still exerts a significant impact on the Chinese education system (Watkins and Biggs; 1996, 2001; Price *et al.* 2011), even on students' use of technologies in the current climate.

### 7.3.1 The impact of respect for authority on student-teacher relationship

Respect for tradition and authority and their impact on the teacher-student relationship is one of the most important characteristics of traditional Chinese culture. The respect for authority in China has a long history, witnessed by the thousands of years of imperial dictatorship. People had to do three kneeling and nine kowtows to show worship to their masters or superiors; even if the emperor had given someone a death sentence, he or she still had to thank the emperor for his mercy. Coupled with the rule of man reinforced by the rule of law, the common people have developed an awareness of strict hierarchies.

According to the traditional concepts, teachers are exemplary people. The role of teachers was 'politeness' (Chinese: 正礼; pinyin: zhènglǐ). Out of respect for 'courtesy' (Chinese: 礼; pinyin: lǐ) and 'doctrine' (Chinese: 道; pinyin: dào), teachers are empowered with absolute authority. Although traditional Chinese philosophy acknowledged that 'a student is not necessarily inferior to his teacher, nor does a teacher necessarily be more virtuous

and talented than his student. The real fact is that one might have learned the doctrine earlier than the other, or might be a master in his own special field' (Han, 802 A.D.), in most circumstances a teachers' authority is not to be challenged. Traditional respect for a teacher's authority and dignity has dominated teacher-student relationships. Students show respect to the teachers' supreme authority by obeying their orders unconditionally and recognizing a strict hierarchical relationship. Questioning the master's teaching is regarded as defiance to authority and thus not encouraged. Students follow the teachers, they dare not go against the teachers, and the teachers would not accept students' innovative viewpoints.

Such traditional 'respect for tradition and authority' has had a positive impact on the development of Chinese culture; however, it has also had a negative influence on modern education, especially on students' use of technology in response to ICT requirements in China. Compared with other countries such as the United Kingdom where students normally respond to what they are required to do, there is an even stronger pressure on Chinese students. In terms of the student-teacher relationship, the role of the teacher's teaching has been over emphasized while the role of student-initiated learning has been neglected, especially in primary and secondary schools. Students have been used to passively receive teaching instead of taking initiatives in self-directed learning. This is reflected in the students' use of technologies: they just passively accept a teacher's requirements in terms of the use of technology (e.g. handing in assignments electronically), and few took the initiative or demanded to apply new technologies in their learning.

In terms of student-teacher communication, teachers are accustomed to asking questions for students to answer but not to be questioned by their students. Teachers often give 'teachings' to their students rather than encouraging equal conversation and open discussion. In a typical Chinese classroom, one would scarcely see students taking the



initiative by raising questions during class, and even if they had doubts, they would keep silent and save their questions for other occasions. The impact of this tradition is evident in students' interviews with regard to their communication with teachers using technologies: most students would not choose to get in touch with teachers when facing problems, although they had the option to do so via telephone, emails, QQ groups, social networking sites etc.

### **7.3.2 The impact of the value of scholarly honour on attitudes towards computers and the Internet**

Traditional values regarding scholarly honour and official rank (Chinese: 功名; pinyin: gōngmíng) have also had a profound impact on people's value systems and the concept of equality towards education. In Chinese history, people believed their personal interests were tied together with the interests of their country. By becoming government officials, people made a contribution to their country and thus brought honour to their family and ancestors. Thus, the tradition of scholarly honour and official rank dominated the country's value orientation towards achievements. In former times, 'the imperial examination system' provided ordinary people with an opportunity to achieve their dream and change their social status. This examination system has helped the country to select a huge number of government officials with genuine ability and learning. Meanwhile, selecting talents through fair competition still has an immediate significance for today's selection system. However, the deficiency of such a philosophy is that it has gone to extremes. In order to compete with thousands of other scholars in the imperial exam and secure an official position, many scholars spend decades, even their whole life, reciting textbooks, writing 'eight-episode essays', and mechanically preparing for examinations. However, those who can succeed are only a tiny number.

The negative influence of such an ideology on today's education system in China, especially the examination system, is overwhelming. Even now, the number of 'famous scholars' or 'government officials' a school can develop has become the main criterion of its teaching quality. Transformed into the modern conditions, the number of students with high marks or the number of graduates admitted into universities has become a priority for schools and teachers. Influenced by such a value system, students and teachers over-emphasise textbooks and examinations at the expense of developing students' other social skills and their ability to learn. As evident from findings of this study, for many students 'computers' were only treated as a subject of study when they were in high school. Rather than being a useful a tool to help with their work and study, the only purpose for many high schools in providing 'computer literacy' courses was to enable students to pass the relevant examinations. A lot of attention was attached to students' scores rather than their non-intellectual qualities such as interests, emotions, motivation and personalities. Many of the students interviewed were prohibited from accessing computers and the Internet at school prior to university, as this was thought by their parents and teachers to be a distraction from their curriculum studies.

## **7.4 Limitations and suggestions for future research**

In appraising the findings of the study, it is also important to interpret the results in the light of the following limitations.

First of all, the present research relied on students' self-reports of their frequency of use and competence levels with various technologies and technological based tools. In using surveys and interviews based on self-reports, I am aware that there are inherited limitations

with this type of data, as students' actual usage and skill levels may be different from what they perceive or recall. While most studies of students' use of technology consist of self-reported snapshots of technology use (e.g. Kennedy *et al.* 2008; Krause, 2007; Jones and Cross, 2009; Kvavik and Caruso, 2005; Selwyn, 2008; Bullen *et al.* 2009), there are few studies that included measures of actual technology use. For example, Judd and Kennedy (2010) used Internet usages logs to investigate students' use of key websites and technology over five years; Riddle (2009) investigated the everyday use of technologies by Australian university students using the Day Experience Method, in an attempt to reduce recall distortion and the ideological biases of interviews, surveys and focus groups. For the purposes of the present study, surveys and interviews were used as the main data collection methods, and the students' self-reported accounts helped us to understand their use of technologies at university. Nevertheless, if I carried out such research in the future, I would include some different methods e.g. real time observation and Day Experience Method (Riddle & Arnold, 2007) to explore these aspects in real contexts in contrast to the present findings.

Furthermore, in appraising the findings, it is important to note that the study was cross-sectional in nature. Cross-sectional data captures events at the same point of time, without regard to differences in time, and thus inherently has its shortcomings. These may be embedded in the data gathered from students' surveys or interviews. For instance, students' use of various technologies at university was measured at a point of time by comparing the students' perceptions regarding the frequency of use of certain technologies with an average performance over time. There is thus a potential mismatch between these two data sets especially when it was later discovered that some of the students were preparing for examinations at the time of study, and may have had less time to spend on computers and the Internet compared with normal term-time. Because of this, students may have under-estimated the frequency of use of the Internet. Although every effort was taken

to reduce the shortcomings in the design of the questionnaire, the risk of the mismatch could not be eliminated entirely. A longitudinal approach would have alleviated such shortcomings but given the extensive number of students involved, such an approach would not have been practicable given the duration of my PhD study.

Although the study aimed to explore 'Net Generation' university students in their use of ICT, the age range of the student sample was not great. Given the Chinese education system, all university students in the same year were of similar ages. All the students in this study fit the definition of 'Net Generation' students. It is thus impossible to compare 'Net Generation' students with 'Non-Net Generation' students. It would also be worthwhile to conduct a similar study with a larger sample of students covering both Net Gen and Non-Net Gen students and to examine whether there is any generational pattern.

Further research is needed to test and extend the findings presented in this thesis. I would encourage other researchers to test the validity of the instrument developed in this study by re-employing the questionnaire in different settings (for example, in other Chinese universities or universities of different kinds). In this way the instrument can be enhanced and its generalisability improved.

The final consideration is the limitation of time and resources. A PhD exercise such as this is often faced with time and financial constraints. Funding by the Open University is limited to three years and hence the structure of the work carried out had to be designed around the stipulated time period. Although it would be nice to capture data from other contexts, the fieldwork including survey and interviews covering a three-month period is considered too short to investigate these issues with students in other universities. The single case study in one institution suggested that, though the research findings shed light on issues concerning university students' use of, skill levels with and attitudes toward the use of technologies in China, it needs to be read with an understanding of the context, and

readers need to take precautions in generalising the findings to other students and institutions. Future research with a larger sample of institutions may help to increase the validity and reliability of the research findings. Despite this, the methods used in the present research were considered appropriate and effective in providing sufficient data sets that complemented each other and contributed to understanding of the research phenomena. Given time and resources, I would like to revisit the issue in some other university contexts.

## **7.4 Contribution to knowledge and understanding of students' use of ICTs in China**

Nevertheless, this study has provided invaluable input to theory and practice. It provides a stepping stone to research on Chinese university students' use of technologies in relation to the Net Generation discussion. This study is a response to the numerous calls that have repeatedly emphasized the need to conduct empirical research that would enhance a body of knowledge about the Net Generation and Digital Natives (Bennett *et al.* 2008). It also contributes to filling the gap of empirical study of Net Generation university students and their use of ICTs in China, as the first empirical survey of university students examining the Net Generation and Digital Native thesis in the context of mainland China.

Overall there is no evidence that there is a single new generation of young students entering Chinese higher education. The terms Net Generation or Digital Native do not capture the processes of change that are taking place. Today's university students are diverse and do not form a single generationally defined cohort. Rather than reading off from the Net Generation and Digital Native claim that purports to describe an entire generation of students at university with a similar age, results from the study showed that other demographic factors such as gender, discipline and year of study all play an

important role in students' use of, perceptions of and use of technologies at university. Further research is needed to identify the full range of additional factors that might have an impact on students' use of technologies at university including mode of study (distance or place-based) and socio-economic background in different regional contexts.

From a practical point of view, course instructors and university administrators alike stand to gain from the findings of this study. According to the Net Generation and Digital Native claim, students are said to be forcing educational change, demanding new kinds of teaching and learning that are not in the current provision. However, the results showed that there is no obvious demand from the students for change of pedagogy despite the need for more and better use of computers and the Internet. Students appreciate and make use of the foundational infrastructure for learning (e.g. PowerPoint course presentations) that is often criticized as being out of date and making only unimaginative use of new technology. The provision of the university's online library, including e-journals and e-books is also perceived positively. Although instant messaging services (e.g. QQ) and social networking tools (e.g. Xiaonei, QQ space) are increasing in popularity among Chinese university students, their usage is mainly for personal, social and entertainment purposes, not study. They do not want universities to intervene in their personal lives. In relation to newer and often-discussed web 2.0 technologies, such as blogs, wikis, virtual worlds, RSS feeds and social bookmarking, students do not naturally make extensive use of these either in their daily lives or to support their learning. Universities should be confident that the current provision of more basic services is filling students' needs. Students still hold traditional views towards teaching and learning and there is no strong demand from the students that universities should take up more and newer technologies in their teaching.

### 7.4.1 Implications for teachers

The Net Generation (Tapscott, 1997; 2008) and Digital Natives claim (Prensky, 2001a; 2001b; 2009) was supposed to force teachers to change their curricula and pedagogies to cater for the needs of the new population of students entering university. The Digital Natives literature positions older people and teachers, in particular, as 'Digital Immigrants' who are unable to completely shake off the 'accent' of having grown up prior to the emergence of digital and networked technologies. However, the results from this study suggested that young students' in China do not fit neatly into the stereotype of the 'Digital Native'. Students do not form a homogeneous generational group in relation to access, competence levels and experiences with technologies and they vary considerably according to their specific contexts and other socio-economic factors. While general ownership and competence levels of some technologies have increased slightly in recent years, there are still a significant number of students who are not participating in activities that are typically associated with the generational argument. University teachers and educational practitioners should pay greater attention to the variety within the student body rather than focusing on the claims of a systematic generational gap between teachers and the student body. Given the diversity of the new generation of students, a 'one size fits all' approach can no longer be adopted. University teachers will be better advised to design teaching solutions that meet the needs of a diversity of learners.

Furthermore I argue that decision making around the use of technologies for teaching and learning should not be based solely on students' preferences and their current practices. Teachers have a clear role to play in selecting appropriate technologies for their teaching approach and the subject area that they teach. They also have a role in developing a deeper

level of skill than can be found spontaneously amongst students entering university. These skills might be in particular tools, such as spreadsheets, but they may encompass wider skills such as information and digital literacy. What is more, educators need to develop a deeper understanding of the educational affordances of these new technologies and how they could be better used to facilitate a range of teaching and learning practices and improve the process and outcomes of students' learning. To achieve this requires an engagement with the educational rationale for the deployment of particular technologies, an active participation in experimentation with different tools and technologies, and the appropriate evaluation of the effectiveness of the technological tools in practice.

#### **7.4.2 Implications for researchers**

While the results from this study showed that students' use of technology varied significantly within the same generation, university students in China did not fit neatly into the stereotype of 'digital native'. This adds to Jones (2011) conclusion that the idea that the ubiquitous nature of certain technologies has affected the outlook of an entire generation should be discarded. Nevertheless, the idea that new technologies have particular characteristics that afford certain types of social engagement is one to be explored. Educational opportunities have been expanded by these new technology affordances. However this is not a simple move determined by technology itself, institutional choices constrained the speed and progress of such a move. Department or course requirements all had an impact on students' choices of technologies in learning. We as researchers and educational practitioners need to make choices about which social environments is most conducive for teaching and learning.

While finding the 'digital native/digital immigrant' dichotomy less useful, this section sets out to explore students' use of technologies in light of 'agency and choice' and 'enabling



and constraining factors'. It is recommended that future researchers explore alternative theoretical frameworks to enhance our understanding of today's young people, and their interaction with technologies in China.

#### **7.4.2.1 Agency and choice**

In contrast to the technological determinism that marked the Net Generation and Digital Natives arguments which presume that technology drives a society's social change, sociological approaches to agency and activity suggest that students act as appropriators of technology (Jones and Healing, 2010b). Interaction with technology is mediated by activity and an intentional stance. In other words, the consequences of the introduction of digital and networked technologies into young people's context does not lead directly to changes in the attitudes and practices of an entire generation.

In response to Czerniewicz *et al.* (2009), Jones and Healing (2010b) provided an account based on understanding young people as active agents in the process of engagement with technology. In contrast to the structural technological determinism that claimed technology as an independent and external factor acting on social forms, student agency (Archer, 2002) provided an alternative framework to describe the position of young people in relation to new technology and how students are actively appropriating new technologies in their lives. Comparing with structure, which describes the factors enabling and constraining the activity, agency is concerned with the shaping of processes by the intentions and projects of humans themselves.

Following Czerniewicz *et al.* (2009), this study provided insights on how students account for their choices in relation to technologies. It is clear that the kinds of choices students

make in terms of which technologies to engage with were influenced by not only the university context and the general technological environment, but also by other social situations and personal motivation. Students were comfortably appropriating technologies for their specific needs, based on contextual factors including the financial implications, their familiarity with the technology, peer-support etc.

Specifically, Chinese students used 163.com or other professional emails to send CVs to potential employers in situations that demanded more formality, and they used QQ email to communicate with friends. Additionally, despite the popularity of instant messaging (IM) as a communication tool with classmates, mobile phones were still the most frequently listed. When cost and immediacy were not an issue, students distinguished between IM and mobile text in terms of communicating with intimate friends and acquaintances. For example, after students changed their mobile SIM cards, they used mobile texts to inform family and close friends about their new mobile number, and used IM with people they were less familiar with or those with whom they maintained a certain distance. Group function in IM was cited as a useful communication tool when a message needed to be relayed to a group. Blogs were also cited as a useful tool for sharing information between friends, where students could present their own opinions. Interestingly, when SNSs such as Kaixin were being used for sharing files and pictures, blogs were used more as a homepage. Confirming the previous findings by Bullen *et al.* (2009) in Canada, the students showed that they were able to identify which tool was best suited to a given task within an identified set of tools.

Alternatively, if there was anything students wanted to talk about in detail, they would send texts to their friends and ask them to get online and log into QQ, which would save money. Two familiar tools were chosen for working together to meet their purposes. Text messages were selected as a first choice because they were instant and could be sent

directly to a personal device that was carried at most if not all times. Online instant messaging services were selected as a second choice because of the cost benefits. They could still have instant communication while not needing to worry about the cost since it was free. This observation is similar to Bullen *et al.*'s (2009) findings in Canada with British Columbia Institute of Technology (BCIT) students, where some students mentioned that, if their classmates were not online, they would phone them and tell them to go online. Both mobile phones and instant messaging were students' most frequently used technologies. Overall, students' use of technology was influenced by three key factors: familiarity, cost and immediacy.

While there is no evidence to suggest that students held a profound understanding of various technologies, the interviews revealed that students were comfortable with choosing which technology to use where and when. In other words, students were sufficiently aware of the pros and cons of each of the tools and were actively appropriating which tools to use according to their specific needs.

#### ***7.4.2.2 Enabling and constraining factors***

The study found a consensus regarding the value of computers with most students being overwhelmingly positive about their benefits. Indeed, a large number of the students were enthusiastic about using ICT to assist with their studies and had a high opinion of their computer skills. While their actual skill levels would need to be evaluated in other research, the findings do suggest that students' use of ICT is enabled by their motivation and confidence.

The students' use of ICT was also enabled by supportive social networks as their family and friends' feedback placed an important role on motivating the student to write more. Overall, the students had good access to supportive contextual resources in terms of interest and actual use. In particular, for IM or SNS tools, students tended to use a specific application more often if their friends and families used it. This finding about the enabling power of supportive contexts corresponds to arguments that strong social networks encourage use (Kvasny, 2002). The role of supportive networks was also linked to settings where friends and family used a computer and could provide support and guidance on both general and particular technology use.

The research identified a cluster of students who used their mobile phones as book readers, MP3 players and storage devices when they did not have access to these separate devices. These students used their smart-phones for reading e-books when the original intention of these tools was that they should be generally used for communication purposes. When I expressed concern about whether the size of the screen would discourage them from reading on their phone, the students reported that they were not put off by this. This raised an interesting question of how students in difficult conditions overcome structural challenges and make choices to use technologies in ways that suit their needs.

The literature on ICTs in education in general and in developing countries in particular provides numerous examples of social conditions where the way that computers are used is constrained by demanding circumstances (Czerniewicz *et al.* 2009). The linear, determinist approach assumes that by creating enabling conditions, actions will automatically improve. However, while ICT use is constrained by lack of access, it is not necessarily enabled by access (Czerniewicz and Brown, 2009). The findings of the present study suggest that, even in constraining circumstances, students find ways of overcoming difficulties and are strategic in choosing technologies to meet their specific needs.

For instance, despite the low computer ownership among students at university, inequalities of on-campus use were not apparent. The students' use of technologies did not seem to be constrained by their low level of ownership. Instead, they were flexible in terms of where and how they accessed computers both on and off campus, with the majority employing multiple strategies and finding a computer wherever they could, for example, at the dormitory next door. Although most students access computers from a computer room or Internet café, the sharing of computers did not seem to be a concern for students. Even when computers were not available in computer rooms, the students were able to go to off-campus to Internet cafés 24/7.

#### **7.4.3 Implications for policy makers**

The Net Generation and Digital Native proponents claim that the current educational system is no longer equipped to accommodate the changing needs of this new generation of learners entering university. Universities are urged to act in response to this challenge by making radical changes to their technical infrastructure, professional development systems, pedagogy and curriculum design, and finally to the structure of the university itself.

However, with regard to educational practice and policy making, I agree with Kennedy et al. (2008) who suggested that 'educators and administrators should look to the evidence about what technologies students have access to and what their preferences are 'to inform both policy and practice' (p. 10).

To develop appropriate policies towards digital culture, we need to better understand the characteristics of these new generation of students and to provide more empirical evidence on the real status of students' access to, competence level and preferences with the varied technological tools around us.

#### **7.4.4 Implications for universities**

The literature review suggested that young people's access to and use of different technologies for different purposes varied considerably. Educational providers and policy makers need to take this variability into account when making changes at course or institutional level. More in-depth investigation of students' technology practice and research into how these technologies are transforming their social and academic lives is essential in substantiating and underpinning the design of educational systems and the policy making process in universities. The results suggested that, while there are students who use technology in a wide range of ways, one cannot assume that being a member of the 'Digital Natives' is synonymous with being naturally capable and confident with technologies. It is even more confusing to assume that being a member of the 'Digital Natives' is synonymous with knowing how to use and being willing to adopt technology-based tools to help with learning in university.

The findings also indicate that many of the university students in China need more support than is often assumed and that a spontaneous engagement with new technology and a university learning environment is insufficient to provide the kinds of support that they require. There are a large number of students whose technological competence is far below what would be expected of Net Generation students. Educational use of technological tools needs to be fully supported by university infrastructures and pedagogical designs. As service providers, universities need to develop plans to support the current and future

technology needs of their students. They also need to develop plans to support the IT requirements of their students and to pay more attention to the design of instructional materials and the provision of systematic digital literacy training to help their students acquire essential skills in using technologies in their learning. On the other hand, to help teachers make better decisions in implementing technology into their teaching, universities need to provide both professional development and opportunities to engage in new ways of working with technology based on educational theory, research and publishing, and communication with other educational practitioners.

Universities have a role in providing a learning infrastructure that both meets students' current needs and anticipates, as much as possible, their future development. While the development of Web 2.0 technologies has generated a debate in western advanced industrial countries (e.g. United Kingdom, United States and Australia) about the use of institutional Virtual Learning Environments (VLEs) or Learning Management System (LMSs) and the potential to provide a more personalised system, sometimes referred to as Personalised Learning Environments (PLEs) (Weller, 2007), ICT development in Chinese higher institutions is still in the stage of developing segmented web services. The results of this study showed that there is no strong demand for this kind of provision from Chinese university students and indeed evidence that certain uses of new technologies would go against the students' wishes. Apart from Open University of China (previously called the China Central Radio and TV University) and other local online distance-learning institutions, traditional Chinese universities were only equipped with separate web services, e.g. online course choose service, online grade checking, online course evaluation service, e-library, and course management system as a working platform for teachers. However these are not VLEs/LMSs in the sense discussed in western discourse. Rather than being a centralised and integrated system that provides support for administration, managing training and educational records, and distributing learning content over the Internet with

features for online collaboration, the most common use of ICT in Chinese universities is as a separate web service to serve the specific needs of students and teachers.

A second consideration for universities in the current climate is the growth in ownership of handheld devices and the availability of the mobile Internet. The interview findings showed that mobile Internet has becoming an increasingly important part of students lives. Students were actively engaged in using mobile phones to meet their personal needs, e.g. reading e-books on mobile phones, using instant messaging on mobile phones, using mobile Internet to browse news and to search for information. Earlier waves of innovation and the way that students have responded to them have shown that the take-up of these devices by students may well not translate automatically into demand or pressure on universities to adopt these technologies, but it will open up a range of new possibilities that universities may wish to explore. Besides students' activities in evading technology constraints, universities may start to explore how mobile technologies can assist in getting around constraints that come from a lack of wired infrastructure at a national and university level.



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## Appendices

### *Appendix A. Sample Information letter to student participants*

Dear Students,

I am a PhD candidate conducting research on students' use of technologies in China at the Open University, UK, supervised by Professor John Richardson and Chris Jones. I'm writing to invite you to take part in a survey for my dissertation study. The result of this study is a requirement for the completion of the doctorate degree. The purpose of the study is to investigate how university students' in China use technologies both in their daily lives and for learning purposes, and to explore the ways technology can support learning in higher education in China.

Technology is an increasingly important tooling in the educational learning process. The better we understand how students interact with technologies both at home and in school, the better we can design curricula to ensure that students will become competitive at school and in the marketplace. Your input represents a crucial step in this process. The survey is composed of four main sections. The first section represents your generation information followed by the second section represents your access to technology. The third section investigates your experience with using technology and the last section specifically represents your experience of learning with technology.

Your participation in this survey is voluntary. You may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. Any information that is obtained in connection with this study and that can be identified with you will be kept confidential and secure, and destroyed at the end of the project. When you complete your survey, please return it to the instructor. Please also note that there is a possibility of a follow-up interview which is entirely voluntary.

If you have any questions, please do not hesitate to contact me or any of the research team:  
John Richardson at [j.t.e.richardson@open.ac.uk](mailto:j.t.e.richardson@open.ac.uk) ; Chris Jones at [c.r.jones@open.ac.uk](mailto:c.r.jones@open.ac.uk) .  
Thank you for taking the time to consider my study.

Yours sincerely,

Binhui Shao

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Milton Keynes  
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# CONSENT FORM

I agree to participate in a study about my experiences of using technology. This information will be confidential.

I agree that the data collected from me may be held and processed by the team for the purposes of research.

Extracts from the survey and interview may be used in presentation or publication, but on account the persons who participated in the study be identified.

I understand that data will be held securely in compliance with Open University and Data Protection Act requirements.

I understand that I can withdraw at any time before the date of data aggregation on 1<sup>st</sup> August 2009.

I understand that I have the opportunity to ask further questions about the research process.

Print name: .....

Contact: .....

Signature: .....

Date: .....

## Appendix B. Questionnaire- English version



The Open University

### University students' use of technologies in China Survey

Please use dark blue or black biro to complete the survey. Please cross the box that corresponds to your answer for each question. If you make a mistake and cross the wrong box, please block out your answer and then cross the correct box, for example: ☒ ☒ ☐ ☐ ☐

The questionnaire asks how you use technologies at home and at school. Your answers will help your university to better understand the needs of its students and will also contribute to wider research and policy making. Thank you again for taking the time to complete this questionnaire.

#### Section A: Background information

1. Please choose your programme of study:

Electronics and Information Engineering	<input type="checkbox"/>	Economics and Management	<input type="checkbox"/>
Computer and Information Technology	<input type="checkbox"/>	Mechanics and Automation	<input type="checkbox"/>
Civil Engineering	<input type="checkbox"/>	Arts and Design	<input type="checkbox"/>
Languages	<input type="checkbox"/>	Education	<input type="checkbox"/>

2. Which year of study are you in?

First year ☐      Second year ☐      Third year ☐      Fourth year ☐

3. Year of born ☐☐☐☐

4. Gender:      Male ☐      Female ☐

#### Section B: Access to technology

1. On average, how many hours do you spend on the computer each day?

1 hour or less ☐      between 1 and 3 ☐      between 3 and 6 ☐      more than 6 ☐

2. In general, how much do you like using computers and other digital technologies?

I don't like using technology at al. ☐

I don't like using technology very much. ☐

I don't mind whether I use technology or not.

☐

I quite enjoy using technology

☐

I enjoy using technology very much.

☐

3. Which of these devices and network connections listed below do you own? (Please tick all that applies)

Desktop computer	<input type="checkbox"/>	Laptop computer	<input type="checkbox"/>
Mobile phone	<input type="checkbox"/>	PDA/ Palm sized computer	<input type="checkbox"/>
MP3/ iPod/ Digital music player	<input type="checkbox"/>	Digital camera	<input type="checkbox"/>
USB memory stick/ card	<input type="checkbox"/>	Handheld games player	<input type="checkbox"/>
Console games player	<input type="checkbox"/>	Dial-up internet access	<input type="checkbox"/>
Broadband internet access	<input type="checkbox"/>	Wireless internet access	<input type="checkbox"/>

4. How often do you perform the following?

	Very Often (more than once a day)	Often (daily)	Sometimes (two or three times a week)	Occasionally (less than twice a month)	Never
a) Audio, video and images					
Listened to an audio file (e.g. MP3) or a podcast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Uploaded audio to the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Edited digital audio on the computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Browse photos on the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Uploaded photo to the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Edited a digital photo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Watched video online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Uploaded video to the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Edited video on a computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**b) Messaging and chat**

Sent or responded to an email	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used an instant messenger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Participated in a text-based chat room	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visited a virtual world (e.g. Second Life, Lively, Active Worlds)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used Internet telephony (VOIP): e.g. Skype	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used video conferencing via the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**c) Social networking sites (e.g. Facebook, Xiaonei, Kaixin, Myspace, etc.)**

Browsed other people's profiles on a social networking site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Edited my own social network profile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Posted messages on a social networking site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sent/received direct messages to others on a social networking site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Share files on a social networking site (i.e. article, photo, video)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comment on other's shared files	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Used the extra applications on a social networking site (i.e. gifts, constellation, fluffy friend, quizzes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>d) Wikis, Blogs, and Web 2.0</b>					
Check information on Wikipedia or other wiki sites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Edited Wikipedia or other wiki sites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Read a blog	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintained own blog	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comment on other's blog	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a social bookmarking service (e.g. Delicious, Furl)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used an RSS feed to provide you with a content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a file sharing service (e.g. Google Docs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a micro-blogging service (e.g. Twitter, Fanfou, TaoTao)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>e) Mobile Phones</b>					
Made and receive calls using a mobile phone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a mobile phone to send text messages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a mobile phone to send digital photos or movies to other people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a mobile phone as a personal organiser (i.e. diary, address book)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a mobile phone to send and received emails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a mobile phone to access information on the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>f) Games</b>					
Played computer console or mobile phone games	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

that don't require you to be connected to a network

Played browser based games online

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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(e.g. Facebook games, Miniclip, quiz/puzzles)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Played multiplayer video games online

**g) Computer Software**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Used a word processing programme (e.g. Word)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used a spreadsheet programme (e.g. Excel)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used a presentation software (e.g. PowerPoint)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used a search engine to search the web

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

**h) University**

Accessed materials relating to your course online

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

(e.g. lecture notes, slides, podcasts, etc)

Accessed general information relating to your

course online (e.g. notices, timetables)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Use a computer for general study, without accessing the web

Use the web to look up reference information for study purposes

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Accessed/ used university's online library resources

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Communicated with other students using university  
online services (e.g. email, forums)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Accessed blogs for your course

Accessed wikis for your course

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Use social networking sites to maintain contact  
with classmates/ lectures

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used discipline-specific technologies  
(e.g. Mathematica, Matlab, AutoCAD, Stella etc.)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Section C: Competence with technology

(In the previous section, you have indicated how frequent you use each of the technologies; in this section, we would like you to indicate how competent are you in performing these technologies.)

1. How competent are you in performing the following activities?

- NOT REALLY COMPETENT  
- I would need help and training to do this
- SLIGHTLY COMPETENT  
- I can do this but often need help
- REASONABLY  
COMPETENT  
- I can usually do this myself but may need help sometimes
- COMPETENT  
- I can do this well without assistance
- VERY COMPETENT  
- I can do this well and explain it to others

b) Audio, video and images

- Listened to an audio file (e.g. MP3) or a podcast
- Uploaded audio to the web
- Edited digital audio on the computer

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Browse photos on the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Uploaded photo to the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Edited a digital photo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Watched video online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Uploaded video to the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Edited video on a computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**b) Messaging and chat**

Sent or responded to an email	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used an instant messenger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Participated in a text-based chat room	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visited a virtual world (e.g. Second Life, Lively, Active Worlds)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used Internet telephony (VOIP): e.g. Skype	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used video conferencing via the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**c) Social networking sites (e.g. Facebook, Xiaonei, Kaixin, Myspace, etc.)**

Browsed other people's profiles on a social networking site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Edited my own social network profile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Posted messages on a social networking site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sent/received direct messages to others on a social networking site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Share files on a social networking site (i.e. article, photo, video)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comment on other's shared files	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used the extra applications on a social networking site (i.e. gifts, constellation, fluffy friend, quizzes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



#### **d) Wikis, Blogs, and Web 2.0**

Check information on Wikipedia or other wiki sites

Edited Wikipedia or other wiki sites

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Read a blog

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Maintained own blog

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Comment on other's blog

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used a social bookmarking service (e.g. Delicious, Furl)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used an RSS feed to provide you with a content

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used a file sharing service (e.g. Google Docs)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used a micro-blogging service (e.g. Twitter, Fanfou, TaoTao)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

#### **e) Mobile Phones**

Made and receive calls using a mobile phone

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used a mobile phone to send text messages

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used a mobile phone to send digital photos or movies to  
other people

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used a mobile phone as a personal organiser  
(i.e. diary, address book)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used a mobile phone to send and received emails

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Used a mobile phone to access information on the web

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

#### **f) Games**

Played computer console or mobile phone games

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

that don't require you to be connected to a network

Played browser based games online

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

(e.g. Facebook games, Miniclip, quiz/puzzles)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Played multiplayer video games online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>g) Computer Software</b>					
Used a word processing programme (e.g. Word)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a spreadsheet programme (e.g. Excel)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a presentation software (e.g. PowerPoint)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used a search engine to search the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>h) University</b>					
Accessed materials relating to your course online (e.g. lecture notes, slides, podcasts, etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accessed general information relating to your course online (e.g. notices, timetables)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use a computer for general study, without accessing the web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use the web to look up reference information for study purposes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accessed/ used university's online library resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communicated with other students using university online services (e.g. email, forums)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accessed blogs for your course	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accessed wikis for your course	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use social networking sites to maintain contact with classmates/ lectures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used discipline-specific technologies (e.g.Mathmatica, Matlab, AutoCAD, Stella etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section D: Learning with technology**

(Thanks again for your cooperation, in this last section, we would like you to indicate how you find the technologies in your study)

1. Please show whether you agree or disagree with each of the statements listed.

	Strongly agree	Agree	Neither agree nor disagree	Mostly disagree	Strongly Disagree
I am enthusiastic about using ICT to assist with my studies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think that the importance of using ICT in education is overestimated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am not clear about how the use of ICT can improve my learning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I didn't expect to rely on the use of computers at university.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I expect the university would help me to master the ICT skills I need.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Suppose you are using the computer to prepare (i.e. research, write) an essay, report or other assignment, do you?

- A. Close down your email inbox etc. so that you can concentrate wholly on your work?
- B. Focus on your work, but maybe check your email etc. every 30 minutes or so?
- C. Switch between your work and email, your chat window, Facebook etc. every few minutes?
- D. Work in another way? If so, please tell us:

3. Suppose your course requires you to use a new tool or computer software that you have not used before, how would you learn to use it? Please indicate the probability for you to adopt each method.

	Probably	Possibly	I don't know	Unlike	Very unlikely
Check if the faculty/department has relevant training program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check if the university IT service centre has relevant training program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Try to learn it yourself, maybe through system help or the manual guide.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ask help from a friend, maybe through system help or the manual guide.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In another way? Please describe:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. In this section, we would like you to tell us about a most useful, enjoyable or impressive tools or websites which you started using during the course. It doesn't matter whether you have used them for your studies or for personal/ social purposes. For example, it could be:

- Websites of resources for your subject
- 'Productivity' tools e.g. EndNote, modelling tools or computer-aided design tools
- 'Social' sites e.g. Facebook, Flickr, Youtube
- Hardware, e.g. webcam, interactive white board

Short description and why you find that useful, enjoyable or impressive:

5. How useful do you find the following activities in your study?

	Very Useful	Useful	Neither useful nor useless	Not very useful	Not useful at all
University's online library resources and catalogues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Turning in assignments online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Online discussion board (posting comments and questions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Online readings and links to other text-based course materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social networking sites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using specialist software/computing supplied by the university	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internet on your mobile phone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Being able to work with other students online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accessing materials relating to your course online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Being able to contact your tutor/ lecture online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Playing computer games	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

6. Please show whether you agree or disagree with each of the statements listed.

	Strongly Disagree	Mostly disagree	Neither agree nor disagree	Agree	Strongly agree
The use of technology seems to be particularly important on my courses at university.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall the technology worked well on my courses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am excited by the use of ICT at university.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It would be good if there was much more use of ICT in my courses.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ICT usage at university has met my expectations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My course concentrated on the subject content, what I had to learn, not the technology.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The way I work with others using the technology seems more important than the subject content on my courses.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I find using technological devices difficult.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I could not check the validity of information I find on the internet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The technology we use distracts me from the course content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I could get technical support I need either from the university.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using the technology requires more time than I can afford.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using the technology at university suites the way I do my work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technology allows me to contact as often as I need with my tutors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technology allows me to interact with students on my courses.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy working online in groups with other students at university.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have learned new skills using the technology at university.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The technology I use at university might help me in my future career.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The way technology has been used at university benefited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
my learning					

7 Are there any other comments you would like to add about how you use of ICT or how would you like ICT to be used at university?

**Further participation in the study**  
 Please tick the box below and enter your email address if you are interested in contributing further to the study by participating in an interview about your use of technology. Thank you very much.

Yes, I am interested in taking part in an interview discussion.


☐

Email address  telephone number





## 中国大学生信息技术使用调查问卷

请用蓝色或黑色圆珠笔填写问卷。请在相对的选项前的小格子里打权。如果要划掉错误选项,请把小格子涂黑然后在新的小格子里打权,如图: 

这份问卷试图了解你在生活和学习中使用信息技术的情况。请仔细阅读并如实填写各项。你的观点将帮助你的大学更好地了解学生需求,并受益更广泛的政策和研究领域。再次感谢你抽出时间回答此问卷。

## 第一部分:背景信息

## 1. 专业/主修课程:

- |                                   |                                       |
|-----------------------------------|---------------------------------------|
| <input type="checkbox"/> 电子信息工程   | <input type="checkbox"/> 经济管理         |
| <input type="checkbox"/> 计算机科学与技术 | <input type="checkbox"/> 机械制造与自动化工程学院 |
| <input type="checkbox"/> 土木工程     | <input type="checkbox"/> 艺术设计         |
| <input type="checkbox"/> 外国语      | <input type="checkbox"/> 学前教育         |

## 2. 你现在是大学几年级?

- ☐ 一年级      ☐ 二年级      ☐ 三年级      ☐ 四年级及以上

3. 出生年份    4. 性别:      男 ☐      女 ☐

## 第二部分:接触信息技术

## 1. 你平均每天在电脑上花几个小时?

- ☐ 1个小时或更少      ☐ 1到3个小时      ☐ 3到6个小时      ☐ 6个小时以上

## 2. 总体来讲,你对电脑和其他信息技术持什么态度?

- ☐ 我一点都不喜欢使用信息技术。  
☐ 我不是很喜欢使用信息技术。  
☐ 我不介意是否使用信息技术。  
☐ 我比较喜欢使用信息技术。  
☐ 我十分喜欢使用信息技术。

3. 下面这些电子设备和网络连接中你拥有哪些? (请在所有适用项前打勾)

- |   |                                   |
|---|-----------------------------------|
| <input type="checkbox"/> 台式电脑                 | <input type="checkbox"/> 笔记本电脑    |
| <input type="checkbox"/> 手机                   | <input type="checkbox"/> PDA 掌上电脑 |
| <input type="checkbox"/> MP3 随身听/iPod/数字音乐播放器 | <input type="checkbox"/> 数码相机     |
| <input type="checkbox"/> USB 存储器/优盘/SD 卡      | <input type="checkbox"/> 手掌游戏机    |
| <input type="checkbox"/> 控制台电子游戏机             | <input type="checkbox"/> 拨号上网     |
| <input type="checkbox"/> 宽带网                  | <input type="checkbox"/> 无线网      |

4. 你进行下列活动的频率是多少?

	很经常 (每天多于一次)	经常 (每天)	有时 (一周两到三次)	偶尔 (每月少于一两次)	从不
<b>a) 声音、图像和视频</b>					
收听语音文件(例如 MP3)或播客 (podcast)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
网络上传语音文件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在电脑上编辑语音文件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在网络上浏览图像	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
网络上传图像	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在电脑上编辑图像文件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在线观看视频网络	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
网络上传视频	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
编辑视频文件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>b) 消息、聊天</b>					
发送或回复电子邮件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用即时聊天软件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
参与文字聊天室	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
参与 3D 虚拟社区(例如, 第二人生/Second Life, Lively, Active Worlds)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用网络电话(VOIP): e.g. Skype	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用网络视频会议	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>c) 网络社交 (例如 校内网, 开心网, Facebook, Myspace 等)</b>					
在社交网站上察看别人的信息	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在社交网站上发布自己的资料	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在社交网站上留言	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	很经常 (每天多于一次)	经常 (每天)	有时 (一周两到三次)	偶尔 (每月少于一次)	从不
在社交网站上给别人直接发送消息	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在社交网站上分享文件 (例如 文章, 图片, 录像)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
评论别人分享的文件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用社交网站上的各种附加板块 (例如 礼物, 星座, 宠物, 小测试等)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>d) 维客, 博客, 和网络 2.0</b>					
察看维基百科或其他维客上的内容	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
编辑维基百科或其他维客	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
阅读博客	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
维护自己的博客	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在别人的博客上评论留言	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用网络书签 (例如 Delicious, Furl, 中国收客网, 百度搜藏, 抽屉, 史库)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
阅读制定的 RSS feed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用文件分享服务 (例如 Google 谷歌 文件)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用微博客 (例如 Twitter, Pownce, 饭否, 叽歪)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>e) 手机</b>					
用手机打电话	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
用手机发送文本短消息	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
用手机发送图片或录像等多媒体信息	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
用手机做个人管理器 (例如日记本, 电话簿)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
用手机接受发送电子邮件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
用手机上网	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>f) 游戏</b>					
玩不需要网络连接的电脑, 控制器或手机游戏	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
玩在线网页游戏 (例如开心网/Facebook 游戏, Miniclip, 问答游戏, 智力测验)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
玩多人网络在线游戏 (例如星际, 魔兽世界等)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>g) 电脑软件</b>					
使用文字编辑软件 (例如 Word)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用做表软件 (例如 Excel)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用 ppt 软件 (例如 PowerPoint)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用搜索引擎	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	经常 (每天 多于一次)	经常 (每天)	有时 (一周两次)	偶尔 (每月少于一次)	从不
<b>b) 大学</b>					
上网访问课程的信息(例如 课堂笔记, 演示文稿, 博客, podcast 等)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
上网访问有关课程的非专业信息(例如 通告, 时间表)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用电脑进行一般的学习活动, 不需要上网	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
上网查找学习相关的文献资料	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用学校网络数字图书馆	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
通过学校网络服务和同学沟通(例如 电子邮件, 论坛)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用课程博客	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用课程维客	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
通过社交网络与同学/老师保持联系	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用课程专业软件(例如 Mathematica, Matlab, AutoCAD, Stella)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 第三部分：信息技术使用水平

(在上一部分的调查问卷中你表示了使用一些信息技术工具的频繁程度，在这一部分请你评价一下自己使用这些技术的熟练程度。)

#### 1. 请你评价自己进行下列活动的技能水平

	能力很强而且还能帮助别人	我可以自己胜任	一般可以但偶尔需要帮助	差不多会但需要帮助	不会
<b>a) 声音、图像和视频</b>					
收听语音文件(例如 MP3)或播客 (podcast)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
网络上传语音文件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在电脑上编辑语音文件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在网络上浏览图像	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	能力很强而且还能帮助别人	我可以自己胜任	一般可以但偶尔需要帮助	差不多会但需要帮助	不会
网络上传图像	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在电脑上编辑图像文件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在线观看视频网络	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
网络上传视频	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
编辑视频文件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) 消息, 聊天					
发送或回复电子邮件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用即时聊天软件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
参与文字聊天室	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
参与 3D 虚拟社区(例如, 第二人生/Second Life, Lively, Active Worlds)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用网络电话(VOIP): e.g. Skype	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用网络视频会议	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) 网络社交 (e.g. Facebook, Xiaonei, Kaixin, Myspace, etc.)					
在社交网站上察看别人的信息	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在社交网站上发布自己的资料	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在社交网站上留言	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在社交网站上给别人直接发送消息	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在社交网站上分享文件 (例如 文章, 图片, 录像)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
评论别人分享的文件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用社交网站上的各种附加板块 (例如 发送礼物, 星座, 宠物, 小测试)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) 维客, 博客, 和网络 2.0					
察看维基百科或其他维客上的内容	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
编辑维基百科或其他维客	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
阅读博客	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
维护自己的博客	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在别人的博客上评论留言	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用网络书签 (例如 Delicious, Furl, 中国收藏网, 百度搜藏, 抽屉, 宝库)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
阅读制定的 RSS feed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用文件分享服务 (例如 Google 谷歌 文件)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用微博客(例如 Twitter, Pownce, 饭否, 叽歪)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	能力很强而且还能帮别人	我可以自己胜任	一般可以但偶尔需要帮助	差不多会但需要帮助	不会
<b>e) 手机</b>					
用手机打电话	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
用手机发送文本短消息	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
用手机发送图片或录像等多媒体信息	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
用手机做个人管理器(例如日记本, 电话簿)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
用手机接受发送电子邮件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
用手机上网	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>f) 游戏</b>					
玩不需要网络连接的电脑, 控制器或手机游戏	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
玩在线网页游戏(例如开心网/Facebook 游戏, Miniclip, 问答游戏/智力测验)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
玩多人网络在线游戏(例如星际, 魔兽世界等)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>g) 电脑软件</b>					
使用文字编辑软件(例如 Word)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用做表软件(例如 Excel)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用 ppt 软件(例如 PowerPoint)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用搜索引擎	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>h) 大学</b>					
上网访问课程的信息(例如 课堂笔记, 演示文稿, 播客/podcast 等)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
上网访问有关课程的非专业信息(例如 通告, 时间表)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用电脑进行一般的学习活动, 不需要上网	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
上网查找学习相关的文献资料	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用学校网络数字图书馆	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
通过学校网络服务和同学沟通(例如 电子邮件, 论坛)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用课程博客	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用课程维客	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
通过社交网络与同学/老师保持联系	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用课程专业软件(例如 Mathematica, Matlab, AutoCAD, Stella)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

第四部分：使用信息技术学习

(再次感谢你的配合，在最后这一部分的调查问卷中我们希望了解你在学习中使用信息技术的情况)

1. 请表示在何种程度上你赞同或不赞同下列陈述？

	赞同	有些赞同	中立	有些不同意	完全不同意
我喜欢用信息技术辅助学习。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我认为用信息技术辅助教学的作用被过于看重了。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我不清楚使用信息技术能怎么帮助我的学习。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我没有期望在人学依赖使用电脑。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我期望人学会帮助我掌握我需要的计算机技能。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. 设想你要用电脑准备（例如 研究，写）一篇文章，报告或作业，你会？（请选择适合的一项）

- ☐ 关掉电子邮件等，全心专注在你的工作上？
- ☐ 注意力在工作上，但可能会察看电子邮件，比如每 30 分钟或其他？
- ☐ 在工作和电子邮件，聊天窗口，或 Facebook 等中每隔几分钟穿插一次？
- ☐ 以另一种方式工作？请做简短描述：

3. 设想你的课程要求你使用一种以前没有使用过的网络工具或计算机程序，你会怎么学习使用它？请填写你会是采取每种方式的可能性。

	很有可能	有可能	不知道	不大可能	很不可能
查看系里/学院是否举办相关培训	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
察看学校电脑服务中心是否举办相关培训	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
试着自学，也许通过系统帮助或说明书	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
找一个朋友一起，或许通过系统帮助或说明书	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
以另一种方式？请描述：					

4. 请描述一个你在大学期间开始使用的你认为最有用，最喜欢或印象最深刻的工具或网站。这些工具或网站可以是你用来学习的或者是为了个人娱乐或社交目的。例如，可以是：

- 你专业课程的网站资源
- ‘有效’的工具例如: EndNote, 建模工具或计算机辅助设计工具
- ‘社会性’网站 例如: Facebook, Flickr, Youtube
- 硬件, 例如网络摄像头, 电子交互白板。

工具/网站: 简短介绍并说明你为什么它觉得最有用，最喜欢或印象最深刻：

5. 请你评价下列项活动在你的学习中的作用。

	很有用	一般有用	中立	不是很有用	一点都没用
使用大学的网上图书馆或目录	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
通过网络上交作业	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
网上讨论区域(发表评论, 问题和答案)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
网上该物和其他课程文本材料的链接	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
网络社交网站	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用学校提供的专业软件	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
手机上网	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
通过网络与同学一起合作完成工作	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
访问网络上与课程相关的资料	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
通过网络与老师保持联系	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
玩电脑游戏	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
参与虚拟网络社区	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



6. 请表示在何种程度上你同意或不同意下列有关在课程中使用信息技术的论断。

	完全赞同	有些赞同	中立	有些不同意	完全不同意
我的人学很重视在课程中使用信息技术。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
总体来讲, 信息技术在我的课程中使用得很好。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我喜欢人学使用信息技术教学。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我希望我的课程里使用更多的信息技术。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
人学里对信息技术的使用达到/符合我之前的预期。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我的课程注重学科内容本身, 而不在信息技术的使用。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我认为通过信息技术与他人交流合作的方式比课程本身的内容更重要。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我觉得使用信息技术很困难。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我质疑网络上信息的可信度。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
课程里使用技术使我不能专心在课程内容上。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我可以通过学校或老师得到我需要的技术支持。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我可以从学校得到我需要的技术支持。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我觉得使用技术需要的时间超出了我的承受范围。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
人学里使用信息技术的方式适合我自身的工作方式。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用信息技术让我可以和老师充分地沟通。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
使用信息技术让我能充分地和同学交流。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
我喜欢在人学通过网络与同学小组合作。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
通过在人学使用信息技术我学到了新的技能。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在人学使用的技术可能会帮助我今后的工作。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
在学校使用技术的方式有助于我的学习。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. 你还有什么关于人学信息技术使用的想法? 或者你希望人学怎么使用信息技术?

进一步参与研究

如果你有兴趣进一步参与这项研究, 请在下面的小格子里打钩, 并留下联系方式, 谢谢。

☐ 是的, 我愿意参与进一步的访谈。

邮件

联系电话

# Appendix D. Quantitative Data Output for Chapter 5

Table 5.27 Means of second order scales by discipline, year of study and gender

	Use of ICT	Attitude to ICT	Skills with ICT
<b>Discipline</b>			
Electronics and Information Engineering	2.81	3.55	3.61
Computing and Information Technology	3.19	3.55	3.76
Civil Engineering	2.74	3.52	3.48
Languages	2.91	3.55	3.39
Economics and Management	2.76	3.56	3.56
Mechanics and Automation	2.79	3.57	3.39
Arts and Design	3.00	3.70	3.66
Education	2.71	3.47	3.39
<b>Year of study</b>			
First year	2.51	3.61	3.48
Second year	2.93	3.53	3.52
Third year	3.16	3.54	3.60
<b>Gender</b>			
Male	3.02	3.56	3.605
Female	2.71	3.56	3.46

Table 5.28 Means of second order scales by discipline and year of study

	First Year	Second Year	Third Year
<b>Use of ICT</b>			
Electronics and Information Engineering	2.40	3.04	3.00
Computing and Information Technology	2.62	3.51	3.43
Civil Engineering	2.38	2.74	3.09
Languages	2.79	2.73	3.22
Economics and Management	2.46	2.68	3.13
Mechanics and Automation	2.40	3.01	2.97
Arts and Design	2.63	3.08	3.30
Education	2.38	2.63	3.12
<b>Attitudes to ICT</b>			
Electronics and Information Engineering	3.61	3.50	3.54
Computing and Information Technology	3.71	3.72	3.22
Civil Engineering	3.47	3.51	3.60
Languages	3.62	3.44	3.58
Economics and Management	3.64	3.47	3.57
Mechanics and Automation	3.64	3.46	3.61
Arts and Design	3.69	3.83	3.57
Education	3.51	3.29	3.62

Table 5.29 Mean scores on use of ICT by discipline and gender

Use of ICT	Male	Female
Electronics and Information Engineering	2.82	2.80
Computing and Information Technology	3.14	3.24
Civil Engineering	2.84	2.63
Languages	3.10	2.72
Economics and Management	3.09	2.43
Mechanics and Automation	2.91	2.68
Arts and Design	3.18	2.83
Education	3.08	2.34

Table 5.30 Means of first order scales by discipline

*Electronics and Information Engineering (EE), Computing and Information Technology (CI), Civil Engineering (CE), Languages (LA), Economics and Management (EM), Mechanics and Automation (MA), Arts and Design (AD), and Education (ED)*

	EE	CI	CE	LA	EM	MA	AD	ED
<b>Use of ICT</b>								
Use of Blogging	2.35	2.82	2.30	2.62	2.39	2.47	2.67	2.34
Use of Interactive	2.27	2.73	2.32	2.63	2.24	2.45	2.58	2.40
Use of Learning	2.69	3.01	2.58	2.79	2.59	2.73	2.85	2.53
Use of Social Networking	2.83	3.28	2.79	3.08	2.82	2.84	2.99	2.80
Use of Office	2.94	3.30	2.75	2.90	2.78	2.76	2.89	2.61
Skill Levels with Blogging	2.95	3.405	2.79	2.91	2.83	2.70	3.11	2.69
Skill Levels with Interactive	3.33	3.53	3.18	3.14	3.21	3.20	3.43	3.13
Use of Digital Photography	3.22	3.40	3.20	3.24	3.22	3.19	3.39	3.17
<b>Attitude to ICT</b>								
Attitude to Usefulness	3.66	3.64	3.57	3.48	3.57	3.53	3.71	3.54
Attitude to Learning	3.64	3.60	3.63	3.64	3.72	3.62	3.82	3.52
Positive Attitude	3.70	3.70	3.66	3.71	3.79	3.83	3.86	3.56
Negative Attitude	3.20	3.26	3.25	3.36	3.16	3.28	3.36	3.27
<b>Skill Levels with ICT</b>								

	EE	CI	CE	LA	EM	MA	AD	ED
Skill Levels with Social Networking	3.53	3.77	3.49	3.29	3.50	3.21	3.57	3.36
Skill Levels with Learning	3.34	3.54	3.26	3.13	3.27	3.08	3.42	3.12
Skill Levels with Office	3.36	3.62	3.16	3.19	3.32	3.16	3.52	3.10
Skill Levels with Mobile	4.22	4.08	4.11	3.97	4.17	4.13	4.14	3.97
<b>Other first order scales</b>								
Use of Mobile	3.77	3.61	3.80	3.72	3.66	3.79	3.69	3.79
Ambivalence	3.10	3.08	3.30	3.32	3.10	3.19	3.14	3.03
Attitude to gaming	2.92	3.02	3.02	3.17	2.99	3.00	3.32	2.76

Table 5.31 Means of first order scales by year of study

	First Year	Second Year	Third Year
<b>Use of ICT</b>			
Use of Blogging	2.02	2.59	2.88
Use of Interactive	1.89	2.52	2.94
Use of Learning	2.33	2.81	3.02
Use of Social Networking	2.52	3.01	3.26
Use of Office	2.56	2.93	3.12
Skill Levels with Blogging	2.66	2.98	3.13
Skill Levels with Interactive	3.01	3.28	3.51
Use of Digital Photography	3.09	3.25	3.42
<b>Attitude to ICT</b>			
Attitude to Usefulness	3.71	3.52	3.53
Attitude to Learning	3.74	3.58	3.63
Positive Attitude	3.82	3.71	3.65
Negative Attitude	3.17	3.30	3.34
<b>Skill Levels with ICT</b>			
Skill Levels with Social Networking	3.36	3.44	3.60
Skill Levels with Learning	3.16	3.25	3.36
Skill Levels with Office	3.17	3.36	3.38
Skill Levels with Mobile	4.23	4.03	4.03
<b>Other first order scales</b>			
Use of Mobile	3.68	3.72	3.79
Ambivalence	2.89	3.21	3.36
Attitude to gaming	2.90	3.01	3.16

Table 5.32 Means of first order scales by gender

	Male	Female
<b>Use of ICT</b>		
Use of Blogging	2.71	2.28
Use of Interactive	2.63	2.27
Use of Learning	2.86	2.58
Use of Social Networking	3.06	2.80
Use of Office	3.00	2.74
Skill Levels with Blogging	3.12	2.73
Skill Levels with Interactive	3.41	3.12
Use of Digital Photography	3.33	3.18
<b>Attitude to ICT</b>		
Attitude to Usefulness	3.57	3.61
Attitude to Learning	3.62	3.68
Positive Attitude	3.71	3.74
Negative Attitude	3.34	3.19
<b>Skill Levels with ICT</b>		
Skill Levels with Social Networking	3.50	3.43
Skill Levels with Learning	3.36	3.15
Skill Levels with Office	3.52	3.08
Skill Levels with Mobile	4.03	4.17
<b>Other first order scales</b>		
Use of Mobile	3.68	3.78
Ambivalence	3.21	3.10
Attitude to gaming	3.21	2.84



Table 5.33 Means of use of blogging by interaction of discipline and year of study

<b>Use of Blogging</b>			
	First Year	Second Year	Third Year
Electronics and Information Engineering	1.82	2.71	2.52
Computing and Information Technology	1.95	3.28	3.23
Civil Engineering	1.88	2.39	2.63
Languages	2.50	2.29	3.05
Economics and Management	1.96	2.33	2.87
Mechanics and Automation	1.92	2.77	2.73
Arts and Design	2.12	2.71	3.18
Education	1.98	2.25	2.80

Table 5.34 Means of access by interaction of discipline and year of study

<b>Use of Interactive</b>			
	First Year	Second Year	Third Year
Electronics and Information Engineering	1.73	2.63	2.46
Computing and Information Technology	1.79	3.04	3.37
Civil Engineering	1.67	2.21	3.07
Languages	2.38	2.51	3.01
Economics and Management	1.81	2.12	2.77
Mechanics and Automation	1.80	2.75	2.78
Arts and Design	1.95	2.61	3.18
Education	2.00	2.30	2.90

Table 5.35 Means of use of learning by interaction of discipline and year of study

<b>Use of Learning</b>			
	First Year	Second Year	Third Year
Electronics and Information Engineering	2.05	2.98	3.05
Computing and Information Technology	2.34	3.41	3.27
Civil Engineering	2.17	2.63	2.94
Languages	2.83	2.54	2.99
Economics and Management	2.19	2.57	3.02
Mechanics and Automation	2.20	2.96	3.00
Arts and Design	2.55	2.92	3.08
Education	2.31	2.47	2.82

Table 5.36 Means of use of office by interaction of discipline and year of study

<b>Use of Office</b>			
	First Year	Second Year	Third Year
Electronics and Information Engineering	2.60	3.19	3.04
Computing and Information Technology	2.87	3.55	3.48
Civil Engineering	2.50	2.61	3.15
Languages	2.83	2.70	3.18
Economics and Management	2.60	2.72	3.03
Mechanics and Automation	2.36	3.07	2.86
Arts and Design	2.43	3.06	3.19
Education	2.28	2.56	2.99

Table 5.37 Means of attitude to usefulness by interaction of discipline and year of study

<b>Attitude to Usefulness</b>			
	First Year	Second Year	Third Year
Electronics and Information Engineering	3.76	3.47	3.75
Computing and Information Technology	4.02	3.66	3.23
Civil Engineering	3.65	3.52	3.53
Languages	3.43	3.41	3.58
Economics and Management	3.80	3.46	3.46
Mechanics and Automation	3.78	3.40	3.41
Arts and Design	3.76	3.85	3.53
Education	3.51	3.34	3.76

Table 5.38 Means of attitude to learning by interaction of discipline and year of study

<b>Attitude to Learning</b>			
	First Year	Second Year	Third Year
Electronics and Information Engineering	3.76	3.44	3.73
Computing and Information Technology	3.81	3.72	3.26
Civil Engineering	3.55	3.60	3.72
Languages	3.67	3.55	3.71
Economics and Management	3.87	3.54	3.76
Mechanics and Automation	3.77	3.44	3.65
Arts and Design	3.94	3.87	3.65
Education	3.55	3.45	3.57

Table 5.39 Means of positive attitude by interaction of discipline and year of study

<b>Positive Attitude</b>			
	First Year	Second Year	Third Year
Electronics and Information Engineering	3.82	3.79	3.48
Computing and Information Technology	3.87	4.00	3.25
Civil Engineering	3.63	3.66	3.69
Languages	3.79	3.68	3.66
Economics and Management	3.84	3.71	3.82
Mechanics and Automation	3.87	3.71	3.92
Arts and Design	3.91	3.95	3.72
Education	3.85	3.19	3.63

Table 5.40 Means of negative attitude by interaction of discipline and year of study

<b>Negative Attitude</b>			
	First Year	Second Year	Third Year
Electronics and Information Engineering	3.05	3.35	3.20
Computing and Information Technology	3.13	3.49	3.15
Civil Engineering	3.07	3.26	3.42
Languages	3.61	3.12	3.37
Economics and Management	3.05	3.15	3.27
Mechanics and Automation	3.12	3.29	3.44
Arts and Design	3.16	3.55	3.36
Education	3.14	3.18	3.50



Table 5.41 Means of skill levels with learning by interaction of discipline and year of study

<b>Skill Levels with Learning</b>			
	First Year	Second Year	Third Year
Electronics and Information Engineering	3.12	3.29	3.60
Computing and Information Technology	3.67	3.57	3.37
Civil Engineering	2.97	3.27	3.22
Languages	3.24	2.81	3.35
Economics and Management	3.11	3.15	3.54
Mechanics and Automation	3.09	3.14	3.01
Arts and Design	3.28	3.52	3.46
Education	2.82	3.23	3.32

Table 5.42 Means of skill levels with mobile phones by interaction of discipline and year of study

<b>Skill Levels with Mobile Phones</b>			
	First Year	Second Year	Third Year
Electronics and Information Engineering	4.35	4.01	4.28
Computing and Information Technology	4.49	3.95	3.79
Civil Engineering	4.13	4.03	4.18
Languages	4.02	3.99	3.91
Economics and Management	4.33	4.01	4.17
Mechanics and Automation	4.42	3.92	4.06
Arts and Design	4.34	4.22	3.88
Education	3.79	4.13	4.00

Table 5.43 Means of ambivalence by interaction of discipline and year of study

<b>Ambivalence</b>			
	First Year	Second Year	Third Year
Electronics and Information Engineering	2.83	3.32	3.13
Computing and Information Technology	2.70	3.20	3.33
Civil Engineering	2.94	3.28	3.66
Languages	3.39	3.16	3.42
Economics and Management	2.73	3.15	3.42
Mechanics and Automation	2.74	3.32	3.51
Arts and Design	2.96	3.24	3.24
Education	2.86	3.04	3.18

Table 5.44 Means of use of blogging by interaction of discipline and gender

<b>Use of Blogging</b>		
	Male	Female
Electronics and Information Engineering	2.41	2.29
Computing and Information Technology	2.78	2.86
Civil Engineering	2.49	2.11
Languages	2.86	2.38
Economics and Management	2.83	1.94
Mechanics and Management	2.61	2.34
Arts and Design	2.85	2.49
Education	2.88	1.81

Table 5.45 Means of use of interactive technology by discipline and gender

<b>Use of Interactive Technology</b>		
	Male	Female
Electronics and Information Engineering	2.31	2.24
Computing and Information Technology	2.57	2.89
Civil Engineering	2.41	2.22
Languages	2.88	2.39
Economics and Management	2.64	1.83
Mechanics and Management	2.52	2.37
Arts and Design	2.77	2.39
Education	2.98	1.82

Table 5.46 Means of use of learning technology by interaction of discipline and gender

<b>Use of Learning Technology</b>		
	Male	Female
Electronics and Information Engineering	2.61	2.77
Computing and Information Technology	2.93	3.09
Civil Engineering	2.72	2.43
Languages	2.93	2.64
Economics and Management	2.89	2.30
Arts and Design	3.06	2.64
Education	2.90	2.17

Table 5.47 Means of use of social networking by interaction of discipline and gender

<b>Use of Social Networking</b>		
	Male	Female
Electronics and Information Engineering	2.86	2.80
Computing and Information Technology	3.21	3.36
Civil Engineering	2.87	2.71
Languages	3.26	2.91
Economics and Management	3.15	2.49
Mechanics and Automation	2.91	2.78
Arts and Design	3.18	2.81
Education	3.07	2.54

Table 5.48 Means of use of office by interaction of discipline and gender

Use of Office	Male	Female
Electronics and Information Engineering	2.88	3.01
Computing and Information Technology	3.32	3.28
Civil Engineering	2.84	2.67
Languages	3.06	2.75
Economics and Management	3.16	2.40
Mechanics and Automation	2.83	2.69
Arts and Design	3.01	2.78
Education	2.90	2.32



Table 5.49 Means of skill levels with interactive technology by interaction of discipline and gender

<b>Skill Levels with Interactive Technology</b>		
	Male	Female
Electronics and Information Engineering	3.37	3.31
Computing and Information Technology	3.52	3.54
Civil Engineering	3.31	3.05
Languages	3.24	3.05
Economics and Management	3.50	2.92
Mechanics and Automation	3.44	2.96
Arts and Design	3.55	3.31
Education	3.39	2.87

Table 5.50 Means of use of blogging by interaction of year of study and gender

**Use of Blogging**

	Male	Female
First Year	2.25	1.79
Second Year	2.71	2.48
Third Year	3.19	2.57

Table 5.51 Means of skill levels with interactive technology by interaction of year of study and gender

Skill Levels with Interactive Technology		
	Male	Female
First Year	3.26	2.77
Second Year	3.34	3.22
Third Year	3.64	3.38

Table 5.52 Means of skill levels with office by interaction of year of study and gender

Skill Levels with Interactive Technology		
	Male	Female
First Year	3.26	2.77
Second Year	3.34	3.22
Third Year	3.64	3.38

Table 5.53 Observed and expected eigenvalues for section B data

Number of Item	Observed eigenvalue	Expected eigenvalue
1	23.177	1.299196
2	3.551	1.273599
3	1.816	1.254541
4	1.682	1.237585
5	1.394	1.222596
6	1.236	1.208467
7	1.225	1.195667
8	1.029	1.183075
9	0.982	1.171189
10	0.884	1.159681
11	0.841	1.148487
12	0.764	1.137746
13	0.698	1.12728
14	0.663	1.116775
15	0.626	1.106957
16	0.597	1.096908
17	0.585	1.087167
18	0.551	1.077794
19	0.531	1.068369
20	0.521	1.059201

Number of Item	Observed eigenvalue	Expected eigenvalue
21	0.5	1.050212
22	0.482	1.041209
23	0.464	1.032084
24	0.457	1.023184
25	0.452	1.014782
26	0.417	1.005779
27	0.413	0.997221
28	0.407	0.988487
29	0.405	0.98001
30	0.378	0.97149
31	0.373	0.963118
32	0.356	0.954674
33	0.339	0.946206
34	0.337	0.937757
35	0.317	0.929469
36	0.314	0.920835
37	0.304	0.912337
38	0.296	0.903853
39	0.292	0.895054
40	0.281	0.8865
41	0.275	0.878157
42	0.266	0.869268

Number of Item	Observed eigenvalue	Expected eigenvalue
43	0.261	0.860527
44	0.249	0.851788
45	0.237	0.842485
46	0.23	0.833032
47	0.227	0.823754
48	0.221	0.813721
49	0.21	0.803665
50	0.199	0.79283
51	0.191	0.781769
52	0.181	0.769477
53	0.166	0.755585
54	0.149	0.737401

Table 5.54 Observed and expected eigenvalues for section C data

Number of Item	Observed eigenvalue	Expected eigenvalue
1	20.954	1.299196
2	5.304	1.273599
3	2.375	1.254541
4	2.064	1.237585
5	1.682	1.222596
6	1.394	1.208467
7	1.291	1.195667
8	1.166	1.183075
9	0.995	1.171189
10	0.96	1.159681
11	0.825	1.148487
12	0.744	1.137746
13	0.674	1.12728
14	0.643	1.116775
15	0.623	1.106957
16	0.574	1.096908
17	0.534	1.087167
18	0.515	1.077794
19	0.482	1.068369
20	0.464	1.059201



Number of Item	Observed eigenvalue	Expected eigenvalue
21	0.443	1.050212
22	0.42	1.041209
23	0.417	1.032084
24	0.405	1.023184
25	0.394	1.014782
26	0.391	1.005779
27	0.369	0.997221
28	0.363	0.988487
29	0.353	0.98001
30	0.339	0.97149
31	0.333	0.963118
32	0.324	0.954674
33	0.317	0.946206
34	0.313	0.937757
35	0.299	0.929469
36	0.295	0.920835
37	0.291	0.912337
38	0.282	0.903853
39	0.275	0.895054
40	0.267	0.8865
41	0.255	0.878157
42	0.251	0.869268

Number of Item	Observed eigenvalue	Expected eigenvalue
43	0.242	0.860527
44	0.24	0.851788
45	0.225	0.842485
46	0.22	0.833032
47	0.213	0.823754
48	0.195	0.813721
49	0.187	0.803665
50	0.182	0.79283
51	0.169	0.781769
52	0.162	0.769477
53	0.158	0.755585
54	0.149	0.737401

# Appendix E. Interview protocol

## Introductory Protocol

[Explain to students the aim of the study and what would happen during the interview.]

‘Thank you for volunteering to take part in this interview. As you know, the aim of the research was to understand how university students in China use technologies in their daily lives and to support learning. My study does not aim to evaluate your techniques or experience. Rather, we are trying to learn more about your own experience with using ICTs and your perceptions of using ICT to support teaching and learning.

I plan the interview to last about an hour to an hour and a half. During this time, I have several questions that I would like you to cover. To facilitate the data analysis, I would like to audio record the interview. Should you agree, please sign this form given to you. Please also be aware that 1) all the information you gave will be held confidentially; 2) your participation is voluntary and you may stop at any time of the research may you feel uncomfortable; 3) we do not intend to inflict any harm. Thank you for your participation’.

## Interviewee background

What is your subject of study?

What year are you in?

Where do you come from?

## Main questions

Do you often use technologies, and what sort of technologies do you use?

[Mobile phones]

How do you often use mobile phones? (i.e. make phone calls, send text messages?)

Why do you do that?

Do you use it for learning or just for social and leisure purposes?

[Computers and Internet]

How do you often use computers?

When did you start to use computers? How did you use computers back then?

Do you have your own computers? Why and why not?

Do you use computers at home?

Do you think it's convenient to go to the computer centre/internet café to get online?

How often do you go there and what would you normally do when go online?

[Following up on students answer on what they often do online, probe for details on how they actually perform certain activities]

[Search engine]

What sort of information do you often look for?

How do you go about search for it?

Could you please give me an example?

[Use of ICT in learning]

How do you use technologies in teaching and learning?

How do teachers use courseware in lectures?

Do you find that useful?

How would you think could improve it?

#### [Mobile internet]

Do you use mobile to surf the internet? Why and why not?

What do you often do with mobile internet?

How do you compare it with using computer internet?

#### [Communication software]

Do you often use emails and how?

Do you use instant messaging? How often do you use it?

What do you chat about?

How do you use group chat?

Do you include teachers in your group chat? Why and why not?

Why do you use mobile phone with some, emails with other, and instant messaging with another? What makes you use one particular application than the other?

What do you chat about with different people on different platforms?

Do you use social networking sites? How often do you use it?

#### [Social networking sites/blogs]

Do you use social networking sites? If year, what sites do you often use?

Why do you use this particular site other than the other?

What do you often do on these social networking sites? What do you like the most?

What sort of 'friend' do you have on social networking sites and why?

How do you compare it with blogs?

[Games]

Do you often play games? What sort of games do you play?

Why and why not?

[Three most frequently used applications]

What are the three things you would do after you switched on your computer? The first three things you would do. i.e. open website or open which application? And why?

[Change with years]

Do you think your use of technology has changed in the last few years? As you go through university. If yes, what has changed and why?

[Attitudes towards ICT]

What are your attitudes towards the use of ICT at university?

Do you think that has met your expectations prior to university?

How would you like ICT to be used at university?

[If taken away]

What kind of technological devices do you have with you? If taken away for a month, what sort of impact it would have on your life?

## Appendix F. Sample interview transcript

院系：学前教育 年级：大一 性别：两女生

Department: Pre-school Education Year of study: First Year Gender: two female

[自我介绍，采访须知许可]

[The researcher gave a self introduction and asked them to sign the consent form.]

[背景信息：大一快毕业了]

[background information: The students are at the end of their first year.]

R: 家是哪的

R(researcher): where you come from?

P2: 江苏的

P2 (participant 2): Jiangsu province.

R: 你们平时经常用电脑呀手机呀 mp3 之类的电子产品么？

R: do you often use technologies, such as computers, mobile phones, mp3 players etc ?

P1: 用手机

P1 (participant 2): we use mobiles.

R: 用手机干什么呀？打电话，发短信？

R: what do you use mobiles for? Make phone calls ? send messages?

P2: 对

P2: right.

P1:用手机发发短信，打打电话什么的

P1: we use mobiles to send text messages and make phone calls.

R: 你呢？你也是么？

R: how about you? The same?

P2: 是呀

P2: yes.

R: 那你平时是打电话多还是发短信多？

R: do you often make phone calls or send text messages?

P1,p2: 发短信多

P1,p2: send text messages

R: 为什么呢？

R: why is that the case?

P1: 因为电话比较贵

P1: because it's more expensive to make phone calls.

R: 一天平均能发多少条？

R: how many text messages you send every day on average?

P1: 有时候说过节啦就发得相对多一点，比如说考试的时候同学之间相互发发短信，鼓励一下。

P1: I'll send more messages during holidays and festivals, and also when there's exam I will send text message to classmates to encourage each other.

R: 你们发短信是用来鼓励考试的？



R: so you send text messages to encourage each other during exam preparation?

P1: 呵呵 。

P1: hehe.

P2: 也不一定，有趣的短信或者平时有事呀

P2: not necessarily, sometimes we will also send when there are funny text messages or something happens.

R: 那同学之间是用来学习还是平时吃个饭呀出去玩呀?

R: so for the message between classmates, is it about leisure or study related?

P1: 学习的不大多。

P1: not so much study related.

P2: 恩

P2: yes.

R: 那你们用电脑多么？

R: then do you use computers often?

P: 不多

R: no.

R: 以前在家的时候高中的时候用么?

R: do you use computers when you were in high school at home?

P1: 也不用

P1: neither.

R: 高中的时候没有计算机课么

R: don't you have computer lesson in high school?

P2: 有啊

P2: yes, we do.

P1: 有啊，我们是周日，周日一天学的，学了一段时间就没了

P1: yes, we do have computer lessons but it's on Sunday. We just learn in on Sundays, and after a while, the course was finished.

R: 那就是把它当作一门学科学的，应试用的，不是平时生活中用的？

R: so you learnt it as a subject, as a exam-oriented subject, not something to use in daily life?

P2: 对。

P2: right.

P1: 恩

P1: yes.

R: 那你们家有电脑么

R: do you have computers back at home?

P1: 没有

P1: no.

P2: 没有

P2: no.

R: 那在这呢？

R: how about here in the university?

P1: 这也没有。

P1: no.

P2: 这也没有，但是有上网的地方

P2: no, we don't have computers here either, but we got places to go online.

R: 有上网的地方，就是在机房是么？

R: do you mean the computer centre?

P1,p2: 对呀

P1,p2: yes.

R: 那你们觉得方便么，想用就能用么还使用一次可费劲了那种？

R: do you think that's convenient to go to the computer centre and get online, or do you think that's too much hassle?

P1: 也不费劲，如果想用就直接到 B 楼就上了

P1: not too much trouble; just go to B building when you want to.

R: 就是挺方便的是么？

R: so you think it's pretty easy?

P2: 恩

P2: yes.

R: 那你们多久去一次？

R: how frequent do you go there?

P2: 主要没课的时候，如果想去都可以去。就是像现在没课不想在自习室就可以去

。

P2: mainly when we don't have classes, whenever you feel like to go, just like now, we don't have classes and if you don't want to stay in the reading room, you are free to go to the computer room.

R: 那你们平时去都干嘛？

R: so what do you often do when go online?

P1: 查查一些什么资料的或者是和朋友聊聊 QQ 聊聊天。

P1: look for some information or chat with friends on QQ.

R: 你呢？

R: how about you?

P2: 大多时候都是聊天或者查查学习资料。

P2: I spend most of my time online to chat or to search for study related information.

R: 什么样的学习资料？怎么查学习资料？

R: what sort of study-related information? How do you search it?

P2: 在百度里面搜索。

P2: I search it in Baidu.

R: 在百度里面搜索？

R: In Baidu?

P1: 就是在百度里面直接就能查出来了。

P1: you just type it into Baidu and the result will come up.

R: 比如说你给我举个例子

R: could you give me an example?

P2: 比如说就象英语听力啦下载一下，假如说要写入党申请书

P2: for example, I download English listening and application letters to join the Party.

R:就下一个模版?

R: download a template?

P1: 恩

P1: yes.

P2:就下那个，学校要什么就下一个

P2: just download it, whatever the university requires.

R: 那你们交作业要用电子邮件么？

R: do you use emails to hand in assignments?

P2: 不用

P2: no, we don't.

P1: 基本上都是手写。

P1: basically we all hand write.

R: 那上课时老师是不是用 ppt?

R: do teachers use ppt during class?

P1: 多媒体，用。教室有多媒体

P1: multimedia, yes, some classrooms have multimedia equipments.

R: 那上课时老师用么

R: do the teachers use it during class?

P2 : 用，上课时老师给课件

P2: yes, they use courseware during class.

R: 都是什么类型的课件，就幻灯片放是么

R: what kinds of courseware do they use? Powerpoint?

P2: 对，就是上什么课讲什么内容，不用手写他就直接放。

P2: yes, just the course content, he just plays us the PowerPoint instead of hand writing.

R: 那你们喜欢这种方式么？

R: do you like this way of teaching?

P1: 现在发现还喜欢

P1: I find myself like it now.

P2: 还行

P2: it's ok.

P1: 像没课的时候上机的时候，上英语课的时候老师给我们放一些电影很有意思

P1: like when we were having class in the computer centre and we were not so busy, the teacher would play us some interesting movies, also when we were having English lessons.

R: 哦 那比如说课件那些幻灯片要是课下你们想要，你们是考下来还是老师邮件给你们发？

R: ok, then what if you want to review the powerpoints the teacher played for you during class, what would happen? Would you go to the computer and copy it yourself or would the teacher send it to you via email?

P1: 如果在电脑上就自己考下来。

P1: if it's on the computer, then just go and copy it ourselves.

P2: 恩

P2: yes.

R: 那如果你们没有电脑考下来怎么看呢，机房？

R: but where do you watch the files after class if you don't have a computer, in the computer centre?

P1,p2 : 对机房。

P1,p2: right, computer centre

R: 那比如说你刚才说的英语听力你考下来怎么听呢？

R: take the English listening you just mentioned for example, where would you play it on?

P1: 放在手机上听

P1: play it on mobile.

R: 手机也能听呀

R: the mobile can play it?

P2: 恩，放内存卡上。

P2: yes, put it on the memory card.

P1: 手机有内存卡呀，带 mp3 的那个手机。

P1: mobiles have memory card and the mobile can play mp3.

R: 哦，等于说就用手机连接把学校电脑上的东西考下来？

R: oh, I see. So you connect your mobile to the university's computer and copy the files?

P1,p2: 对。

P1,p2: right.

R: 那你们手机上网么？

R: do you use your mobile to surf the Internet ?

P1: 我手机不带上网的。

P1: my mobile doesn't have that function.

P2: 有的带。

P2: some mobiles have.

R: 你用么 ?

R: do you use?

P2: 用 , 但是每月就只能上 QQ, 没有别的。

P2: yes, but I can only log into QQ every month, nothing else.

R: 只能上 QQ 呀

R: you can only log in QQ?

P2: 对呀

P2: yes.

R: 百度呀搜索呀什么的上的了么 ?

R: you can't do anything else like Baidu search?

P2: 不能 , 那个不能。

P2: no, I can't do that.

R: 那上 QQ 要钱么 ? 和普通的发短信一样么 ?

R: does it cost to use QQ on mobile? Is it the same as sending a normal text message?



P2: 要，和普通的互联网一样的。不是，就是一个月固定，一要多少流量，5 元，10 元，20 元你自己决定的，包流量自己扣的。

P2: it does cost, the same as normal web usage. It's not the same with normal text message service, this is pay monthly, you can decide which tariff you want, 5yuan, 10yuan, 20 yuan, you decide which ever you want and the tariff will be deducted automatically.

R: 你就是用这种么？

R: do you use this pay monthly service?

P2: 有时候用，不大用。

P2: sometimes I use, not very often.

R: 你觉得那个方便么？

R: do you think it's convenient?

P2:挺方便，就是没事的时候随时就可以上了，不用跑到机房再去上了。

P2: It's convenient, I can use it whenever I want, and I do not need to go to the computer rooms any more.

R: 就上 QQ 么

R: only QQ?

P2: 恩

P2: yes.

R: 那你上 QQ 平时都是和什么人聊？

R: what sort people you chat with on QQ?

P2: 朋友呀。

P2: friends.

R: 就是同学么？

R: like classmates?

P2: 熟悉的人。

P2: someone familiar.

R: 聊什么内容呢？ 由学习相关的么？

R: what do you chat about? Study related issues?

P2: 有啊，就是学什么了，最近他学的什么，学得怎么样，考什么

P2: yep, such like what have you learnt recently, how he's getting on recently, with study, with exams etc ?

R: 那就是本学校的还是以前的朋友？

R: are they you friend from this university or your old friends known before?

P2: 以前的。

P2: old friends.

R: 问问他考什么学什么

R: ask him what he has learnt, what kind of exams he have?

P2: 恩

P2: yes.

R: 那和现在的朋友呢，比如说同班同学，你们用 QQ 聊天么？

R: how about with current friends, such as your classmates here, do you chat on QQ?

P1: 聊阿，有一个我们班自己的 QQ 群。里面有我们的班主任，我们建的就把他加进去。我们班同学就建了一个群用 QQ 聊天。

P1: yes, we have a QQ group among our class and our tutor is also within the group. We created the group and added him. We use our QQ group to chat among class member.

R: 那你们觉得有班主任在会不会在一定程度上影响学生交流的自由？会不会有些话不敢说？

R: would you chat as freely as usually with the presence of the teacher in charge or would be a bit concerned on some sensitive subject?

P1: 对呀，班主任有时当面说话的时候有些约束。但是在 QQ 上就感觉和朋友一样。在 QQ 上可以说一些平时不敢当面说的话。

P1: yes. We feel chatting with the tutor face-to-face intimidating, but on QQ, we feel like chatting with friends. We can say something on QQ with the tutor that we wouldn't feel comfortable talking about face-to-face.

P2: 恩。

P2: yes, exactly.

R: 见面不敢说的 QQ 就敢说呀？

R: do you can say some on QQ which you wouldn't in a face-to-face situation?

P2: 对呀，因为见不着人嘛。

P2: yes, because you can't see him.

R: 他知道你是谁么？

R: does he know who you are?

P1: 有的 QQ 上显名字。

P1: some QQs can show names.

P2: 有时可能知道名字对不上人。

P2: but sometimes even he knows your name, it's possible that he won't put the name into the right person.

R: 你们班多少人呀？

R: how many people are there in your class?

P1: 30 多个。

P1: more than thirty.

R: 那还对不上人呀？

R: he can't your names into person for that number?

P2: 他带的班多，一个老师带 5，6 个。

P2: but he has many other classes to take care of, 5 or 6 classes altogether.

P1: 他是我们班主任，还有一个辅导员。班主任是管我们心灵问题呀，或者学习上有压力什么的都可以去找他。

P1: he is our teacher in charge, and there is another tutor. The teacher in charge is responsible for our mental problems, if we have any pressure with study we can go to him.

R: 那你们平时都在群里聊些什么？和班主任和同学？

R: so what do you often chat in the QQ group, with teacher in charge and classmates?

P2: 遇到班主任是很少的情况。

P2: we rarely meet the teacher in charge there.

P1: 班主任很少上的。

P1: he logs in very few.

P2: 和同学的话都是单个人聊，在群里聊打扰别人。因为别的同学聊天的时候，群里都会闪，挺烦人的。

P2: it would be individual chats with classmate, because it disturbs others to chat in the group. When someone talks in the QQ, the group icon flashes, it's a bit annoying.

R: 呵呵。那你们大多数都聊些什么内容，比如说是私人的问题呀？还是学习的问题？

R: hehe, so what kind of subject you often chat about, for example, personal issues or study related issues?

P2: 都有。

P2: both.

P1: 和现在同学聊的感觉没有和以前同学聊得多。现在的同学都在一个班，整天都说话，也没啥好聊的。

P1: it feels like we chat more with old classmates rather than current classmates. We talk with current classmates everyday in the class and there's not so much to talk about.

R: 那你们住宿怎么住？一个班的同学住在一起？

R: how is your dormitory arranged? You live together with classmates?

P2: 也有混合宿舍。

P2: there are also mixed dormitories.

P1: 多出来的一些和别的班的一起住。

P1: those left who can't be fit into a dormitory live with students from other classes.

R: 那你们除了用 QQ 还用别的么？比如说 Msn 什么的？

R: ok, so apart from using QQ, what else do you use, for example, msn?

P2: 我有 51。

P2: I use 51.com

R: 你呢？

R: how about you?

P1: 我没建。

P1: I didn't set up my 51 account.

R: 51 是什么？

R: what is 51?

P2: 是一个自己建的网页，和博客似的。

P2: you can set up your own webpage, similar to blog.

R: 和博客似的？

R: similar to blog?

P1: 但是和博客还是不一样，里面可以照照片，和朋友聊天留言什么都可以。

P1: but not the same with bog, you can upload your pictures, chat with friends, leave board messages etc.

R: 就像那种社交网站？什么开心网那种？

R: is it a social networking site, like Kaixin?

P2: 应该差不多。

P2: about the same.

R: 那个你用么？

R: do you use it?

P1: 我不用那个。

P1: no, I don't.

R: 51 什么网址呀

R: what is the web address for 51?

P2: 那个使自己申请的，注册什么的，使我朋友以前帮我弄得。

P2: you can apply for yourself, register etc, my friend helped me with that.

R: 那你上面一般都加什么样的朋友呢？

R: what sort of friends you add there ?

P2:主要就是认识的，认识的以前同学朋友什么，陌生人的就不加了。

P2: mainly someone I know, old classmates and friends, I won't add strangers.

R: 只加认识的？

R: so you only add someone you know already?

P2: 嗯。

P2: yes.

R: 你上边有多少朋友？

R: how many friends have you got with 51 ?

P2: 很多，具体的也不记得了。

P2: a lot, I can't remember the exact figure.

R: 几百个有么？

R: hundreds?

P2: 没有，主就是高中的那些同学，有的那些没有 51 的就加 QQ.

P2: no, not that much, it's mainly high school classmates, some of them who don't have 51, I'll add them on QQ.

R: 哦，那就是说 QQ 是 51 的代替？

R: ok, so shall we say QQ is a supplement for 51?

P1, p2: 呵呵，差不多。

P1, p2: hehe, almost.

R: 那你多久上一次 51？

R: How often do you use 51?

P2: 一上网时，有时候学校网吧网速比较慢就不上，如果学校网速可以上去的话就看一下。

P2: every time I go online, unless sometimes when the computer is slow in the computer centre. If the Internet connection speed is alright, I'll log in and have a look.

R: 一上网就看？那我问你比如说你们俩同时开了电脑，你先做的三件事是什么？比如说先看什么网站或先开什么东西？

R: every time you go online? so let me ask you, what are the first three things you would do after you switched on your computer? For example, you'd open up which website or which application?

P1, p2: 先登 QQ。

P1, p2: log in QQ first.

R: 你是先登 QQ, 然后呢？



R: so you log in QQ first, then what?

P2: 然后登 51。

P2: then 51.

R: 然后呢？

R: and?

P2: 然后到百度里搜索一下。

P2: then do some searching in Baidu.

R: 那你呢？

R: what about you?

P1: 我没有 51。

P1: I don't have 51.

R: 那你干嘛？先登 QQ, 然后呢？

R: then what do you do after logging in to QQ?

P1: 然后上百度查查要的东西。

P1: then go to Baidu and search for what I want.

R: 那除了搜索，看新闻呀什么的做什么？

R: apart from searching, do you watch news or anything like that?

P2: 新闻不会看。

P2: I don't watch news.

P1: 不看。

P1: no.

R: 那看电影？

R: movies？

P1: 也不会看电影。

P1: I neither watch movies.

P2: 电影都是下在手机里看。在那里边看太费钱了，下了看省钱。

P2: I watch movies on my mobile, it's so expensive to watch movies there, I download and watch to save money.

R: 里面看还要钱么？

R: does it cost to watch it there?

P1,p2: 要阿

P1,p2: yes.

R: 机房还收钱的？

R: so the computer centre costs?

P1: 1 块 5 一小时。不固定，有的地方 1.5, 有的地方 1 块。

P1: 1.5 yuan per hour. It depends, sometimes 1.5yuan and other place costs 1 yuan.

R: 那你平时都在学校的机房上还是去外面？

R: so do you often go to the computer centre on campus or go outside？

P1: 有时也出去，偶尔的时候。

P1: I do go out sometimes, occasionally.

R: 你们有邮箱么？

R: have you got an email?

P1,p2: 没。

P1,p2: no.

P2: 我只有一个 51.

P2: I just have one 51.

R: 为什么不申请邮箱？

R: why don't you apply for a email address?

P1, p2: 不会申请。

P1, p2: we don't know how to apply.

R: 大学 4 年想买电脑么？

R: have you ever thought of buying a computer during your four years university?

P1,p2: 没。

P1,p2: no.

R: 比如说你们班 30 个人，你觉得自己有电脑的有多少个？

R: for example you got 30 people in your class, how many of you do you think has his/her own computer?

P1: 没有一个。

P1: none of them.

R: 没有一个？

R: none of them?

P2: 恩，因为我们班平时用不着，不是学计算机的，学计算机的那个班他们人守一个吧。

P2: yes, because we don't need to use a computer, we are from computer department and they will probably have one each people.

R: 专业的问题啊？

R: so you think it's about the discipline?

P1,p2: 恩，对。

P1,p2: yes.

R: 那你们专业用这种电子教学的平时没有？

R: don't you have ICT teaching for you major?

P2: 电子教学应该没有。

P2: there should be no ICT teaching.

R: 那你觉得他们大三大四的也这样么？

R: do you think it's the same for third year or fourth year studies?

P2: 我们这个专业应该也没有。因为我们这个主要是手写画画儿童，不用电子的。

P2: I don't think we'll have ICT teaching for our major, because our major is about learning how to teach children to draw with hands, not with technology.

R: 那你们上网找资料只用百度么，有用过 google 么？

R: and do you only use Baidu as a search engine? Have you ever used Google?

P2: 没用过。

P2: no, I haven't.

P1: 只用百度。因为这会这一个。

P1: only Baidu, because that's the only one I know how to use.

R: 那你觉得百度找信息找的效果好么？

R: do you think Baidu gives you good search results?

P1: 还行。

P1: it's ok.

R: 你就输进去就能出结果？

R: you just input what you want and the result will come up?

P1: 有的是那种出来网页，然后再从网页里面找。

P1: some web pages will come up and then you search from the web pages.

R: 你们学外语的时候没有说看什么英语网站么？

R: do you go to any English websites when you learn English?

P2: 没有。

P2: no.

P1: 我们上英语的时候我们有英语 1，英语 1 里面没有多媒体。老师就直接讲那种，然后在黑板上写，然后我们在下面记笔记那种。大学英语就是有多媒体，老师上课的时候就是把课文什么的投影到上面去，然后就直接讲课，下面记就行了。

P1: we use English 1, the text book when we learn English, and there is not much multimedia in English 1. The teacher is just there giving lectures, writing on the board and we copy the notes. College English has multimedia resources. The teacher just project the texts onto the screen and give lectures, we just copy.

R: 老师是照着幻灯片读么?

R: the teacher just read the PowerPoint slides?

P1: 恩

P1: yes.

P2: 是啊。

P2: right.

R: 你觉得用这种方式好么?

R: do you think it's a good way of learning?

P2: 习惯了。

P2: I've already got used to it.

R: 每个老师都这样?

R: every teacher does this?

P2: 嗯。

P2: yes.

R: 就照着幻灯片读?

R: just read the Powerpoint slides?

P2: 恩, 他就看他要讲的内容。

P2: yes, depends on what he wants to give lecture on.

R: 那你们会不会想老师讲的内容和幻灯片一样干什么还要去上课呀?

R: then would you think of not going to class if the lecture content is exactly the same with the powerpoint slides?

P2: 老师有的时候还改一些加一些。

P2: the teacher will change and add content sometimes.

R: 你们出勤率高么？

R: have you got a high attendance rate?

P1: 全到的，每次都点名的。

P1: everybody goes, the teacher call names everytime.

R: 那你们电脑除了 QQ 和搜索引擎还用别的东西么？比如说写个文档，ppt,表格，图片，这些东西你们用么？

R: so what else do you do with the computer apart from using QQ and search engines, for example do you use word, powerpoint, excels, pictures etc?

P2: 不太用。

P2: not a lot.

P1: 不用。

P1: no.

R: 为什么呢？是因为你们没用过还是？

R: why, is it because you haven't used those before?

P2: 不需要。

P2: there's no demand.

P1: 我们的专业没用，不需要，也不太会用。

P1: not for our major, we don't need to use them and we don't know how to use them either.

R: 那你们没有上网，普通的计算机课什么的么？

R: do don't you have normal computer lessons or about using the Internet etc ?

P2: 上网归上网。

P2: getting online is getting online.

R: 现在还上么？

R: do you still do that?

P1: 就几次。

P1: just a few times.

P2: 上。就是考试焦点。但是就是为了考试而开课。

P2: yes, that's the exam point. We open the course for exams.

R: 那都讲什么呢？讲得都不太实用是么？

R: so what's the course about? Not so practical?

P1: 也行。

P1: that's ok.

P2: 计算机课主要是为了考试。反正就是考什么讲什么。主要是为了通过考试。

P2: We did have computer lessons, but just for the exams. We learn what will be covered in the exams, and the main aim was to pass exams

R: 那比如说 ppt 做幻灯片你们会么？

R: then for example, do you know how to make PowerPoint?

P1,p2: 现在还没学呢。

P1,p2: we haven't learnt that yet.



P1：以后我们会学。快毕业了什么的。

P1: we'll learn that in the future, when we about to graduate.

R: 比如说 word 文档，就是写文本文件的那个，那个你们都行么？

R: how about word, the one to write text files, can you use that ?

P2: 嗯，那个行。

P2: yes, I can do that.

R: 作图呢？也没学？

R: how many editing picture? Have you not yet learnt as well?

P1: 还没开始。我们现在只是用手画，刚开始现在。

P1: we haven't started learning yet. All we do now is to learn how to draw with hands, just started.

R: 那除了电脑，mp3 之类的。你们打游戏么？

R: so apart from using computer, mp3 player etc, do you play games?

P1,p2: 不打。

P1,p2: no.

R: 那手机上的游戏呢？

R: how about games on your mobile ?

P1: 手机上游戏也不多，玩腻了。

P1: there is not a lot of game on my mobile, and I get fed up with those.

R: 那你觉得这整个电子科技在你们生活中有什么重要地位么？

R: so do you think technologies have played any important role in your life?

P1,p2: 没。

P1,p2: no.

R: 那你们现在身上都有什么电子设备所有的？

R: what kind of technological devices have you got on you?

P1,p2: 就一个手机。

P1,p2: just a mobile.

R: 那把你手机拿走了你觉得对你生活有影响么？

R: do you think there would be an impact to your life if I took away your mobile?

P2: 应该没

P2: there shouldn't be any.

P1: 没多大影响。

P1: not a big impact.

P2: 就除了上课同学问你在哪呀，没什么大的影响。远方的朋友现在不联系偶尔用公用电话打个电话什么的。

P2: not much impact apart from some classmates would ask where you are for class. you could make phone calls in a public phone box to friends in a distance who hasn't been in contact in a while.

R: 主要生活范围就是同学见面对面的交流？

R: so most of your daily contacts would be face-to-face with classmates?

P1, p2: 对。

P1, p2: yes.

R: 好的，多谢你们的时间。很高兴见到你们。

R: right, thank you very much for your time. Nice meeting you.